Case No. 146.1335

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Cortes, J. et al.

Serial No. : 09/463,705   Group Unit : 1652

Filed : February 23, 2000   Examiner : Rao, M.

For : BIOSYNTHESIS AND TRANSFER GENES OF 6-DESOXYHEXOSES IN SACCHAROPOLYSPORA ERYTHRAEA AND IN STREPTOMYCES ANTIBIOTICUS AND THEIR USE

Statement Under 37 C.F.R. §1.821(f) or §1.825(b)

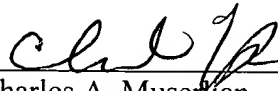Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

I hereby certify that:

[X]   The paper Sequence Listing submitted herewith and computer readable Sequence Listing attached hereto are identical (37 C.F.R. §1.821(f)).

[ ]   The substitute paper Sequence Listing and substitute computer readable Sequence Listing submitted herewith are identical. No new matter is included (37 C.F.R. §1.825(b)).
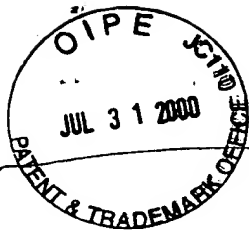
Respectfully submitted,

BIERMAN, MUSERLIAN AND LUCAS, L.L.P.

Date: _7/31/00_   By: _____
Charles A. Muserlian
Reg. No. 19,683

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(212) 661-8002 Telecopier

558604_1

#10

SEQUENCE LISTING

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<110>  Cortes, J
       Fromentin, C
       Gaisser, S
       Leadlay, P
       Mendez, C
       Michel, J-M
       Raynal, M-C
       Salah-Bey, K
       Salas, J

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       SACCHAROPOLYSPORA ERYTHRAEA AND IN STREPTOMYCES
       ANTIBIOTICUS AND THEIR USE

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3

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Cys Glu Gly Ser Leu Arg Arg Leu Gly Val Asp His Ile Asp Val Tyr
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Gln Met His His Ile Asp Arg Ser Ala Pro Trp Asp Glu Val Trp Gln
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145                 150                 155                 160

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Arg Arg His Ser Leu Gly Met Val Ser His Gln Cys Leu Tyr Asn Leu
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Gly Leu Gly Val Phe Ala Trp Ser Pro Leu His Gly Gly Leu Leu Ser
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Tyr Glu Lys Phe Cys Arg Asn Leu Gly Glu Asp Pro Ala Glu Val Gly
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5

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Gly Met Arg Tyr Val Asp Tyr Asn Gly Pro Ser Val Val Pro Glu Trp
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His His Gly Gly Pro Gly Ser Trp His Thr Ala Ala Ile His Gly Val
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    290             295             300

ctc acc gac ggc atc gac cgg acg gtg gcc gcc ctg acc ccc acc gag    1201
Leu Thr Asp Gly Ile Asp Arg Thr Val Ala Ala Leu Thr Pro Thr Glu
305             310             315             320

gag cac ta gtg cgg gta ctg ctg acg tcc ttc gcg cac cgc acg cac    1248
Glu His     Met Arg Val Leu Leu Thr Ser Phe Ala His Arg Thr His
            325             330             335

ttc cag gga ctg gtc ccg ctg gcg tgg gcg ctg cgc acc gcg ggt cac    1296
Phe Gln Gly Leu Val Pro Leu Ala Trp Ala Leu Arg Thr Ala Gly His
            340             345             350


gac gtg cgc gtg gcc gcc cag ccc gcg ctc acc gac gcg gtc atc ggc    1344
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10

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Asp Val Arg Val Ala Ala Gln Pro Ala Leu Thr Asp Ala Val Ile Gly
        355                 360             365

gcc ggt ctc acc gcg gta ccc gtc ggc tcc gac cac cgg ctg ttc gac    1392
Ala Gly Leu Thr Ala Val Pro Val Gly Ser Asp His Arg Leu Phe Asp
        370                 375             380

atc gtc ccg gaa gtc gcc gct cag gtg cac cgc tac tcc ttc tac ctg    1440
Ile Val Pro Glu Val Ala Ala Gln Val His Arg Tyr Ser Phe Tyr Leu
        385                 390             395

gac ttc tac cac cgc gag cag gag ctg cac tcg tgg gag ttc ctg ctc    1488
Asp Phe Tyr His Arg Glu Gln Glu Leu His Ser Trp Glu Phe Leu Leu
400                 405             410             415

ggc atg cag gag gcc acc tcg cgg tgg gta tac ccg gtg gtc aac aac    1536
Gly Met Gln Glu Ala Thr Ser Arg Trp Val Tyr Pro Val Val Asn Asn
                420             425             430

gac tcc ttc gtc gcc gag ctg gtc gac ttc gcc cgg gac tgg cgt cct    1584
Asp Ser Phe Val Ala Glu Leu Val Asp Phe Ala Arg Asp Trp Arg Pro
        435                 440             445

gac ctg gtg ctc tgg gag ccg ttc acc ttc gcc ggc gcc gtc gcg gcc    1632
Asp Leu Val Leu Trp Glu Pro Phe Thr Phe Ala Gly Ala Val Ala Ala
        450                 455             460

cgg gcc tgc gga gcc gcg cac gcc cgg ctg ctg tgg ggc agc gac ctc    1680
Arg Ala Cys Gly Ala Ala His Ala Arg Leu Leu Trp Gly Ser Asp Leu
        465                 470             475

acc ggc tac ttc cgc ggc cgg ttc cag gcg caa cgc ctg cga cgg ccg    1728
Thr Gly Tyr Phe Arg Gly Arg Phe Gln Ala Gln Arg Leu Arg Arg Pro
480                 485             490             495

ccg gag gac cgg ccg gac ccg ctg ggc acg tgg ctg acc gag gtc gcg    1776
Pro Glu Asp Arg Pro Asp Pro Leu Gly Thr Trp Leu Thr Glu Val Ala
                500             505             510

ggg cgc ttc ggc gtc gaa ttc ggc gag gac ctc gcg gtc ggg cag tgg    1824
Gly Arg Phe Gly Val Glu Phe Gly Glu Asp Leu Ala Val Gly Gln Trp
        515                 520             525

tcg gtc gac cag ttg ccg ccg agt ttc cgg ctg gac acc gga atg gaa    1872
Ser Val Asp Gln Leu Pro Pro Ser Phe Arg Leu Asp Thr Gly Met Glu
        530                 535             540

acc gtt gtc gcg cgg acc ctg ccc tac aac ggc gcg tcg gtg gtt ccg    1920
Thr Val Val Ala Arg Thr Leu Pro Tyr Asn Gly Ala Ser Val Val Pro
        545                 550             555

gac tgg ctc aag aag ggc agt gcg act cga cgc atc tgc att acc gga    1968
Asp Trp Leu Lys Lys Gly Ser Ala Thr Arg Arg Ile Cys Ile Thr Gly
560                 565             570             575

ggg ttc tcc gga ctc ggg ctc gcc gcc gat gcc gat cag ttc gcg cgg    2016
Gly Phe Ser Gly Leu Gly Leu Ala Ala Asp Ala Asp Gln Phe Ala Arg
                580             585             590

acg ctc gcg cag ctc gcg cga ttc gat ggc gaa atc gtg gtt acg ggt    2064
Thr Leu Ala Gln Leu Ala Arg Phe Asp Gly Glu Ile Val Val Thr Gly
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11

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              595                    600                    605

tcc ggt ccg gat acc tcc gcg gta ccg gac aac att cgt ttg gtg gat    2112
Ser Gly Pro Asp Thr Ser Ala Val Pro Asp Asn Ile Arg Leu Val Asp
        610                    615                    620

ttc gtt ccg atg ggc gtt ctg ctc cag aac tgc gcg gcg atc atc cac    2160
Phe Val Pro Met Gly Val Leu Leu Gln Asn Cys Ala Ala Ile Ile His
        625                    630                    635

cac ggc ggg gcc gga acc tgg gcc acg gca ctg cac cac gga att ccg    2208
His Gly Gly Ala Gly Thr Trp Ala Thr Ala Leu His His Gly Ile Pro
640                    645                    650                    655

caa ata tca gtt gca cat gaa tgg gat tgc atg cta cgc ggc cag cag    2256
Gln Ile Ser Val Ala His Glu Trp Asp Cys Met Leu Arg Gly Gln Gln
                   660                    665                    670

acc gcg gaa ctg ggc gcg gga atc tac ctc cgg ccg gac gag gtc gat    2304
Thr Ala Glu Leu Gly Ala Gly Ile Tyr Leu Arg Pro Asp Glu Val Asp
                675                    680                    685

gcc gac tca ttg gcg agc gcc ctc acc cag gtg gtc gag gac ccc acc    2352
Ala Asp Ser Leu Ala Ser Ala Leu Thr Gln Val Val Glu Asp Pro Thr
        690                    695                    700

tac acc gag aac gcg gtg aag ctt cgc gag gag gcg ctg tcc gac ccg    2400
Tyr Thr Glu Asn Ala Val Lys Leu Arg Glu Glu Ala Leu Ser Asp Pro
        705                    710                    715

acg ccg cag gag atc gtc ccg cga ctg gag gaa ctc acg cgc cgc cac    2448
Thr Pro Gln Glu Ile Val Pro Arg Leu Glu Glu Leu Thr Arg Arg His
720                    725                    730                    735

gcc ggc tagcggtttc cgaccgacaa gtccgtccga cagcacacct ccggagggag    2504
Ala Gly

caggg atg tac gag ggc ggg ttc gcc gag ctt tac gac cgg ttc tac cgc 2554
      Met Tyr Glu Gly Gly Phe Ala Glu Leu Tyr Asp Arg Phe Tyr Arg
           740                    745                    750

ggc cgg ggc aag gac tac gcg gcc gag gcc gcg cag gtc gcg cgg ctg    2602
Gly Arg Gly Lys Asp Tyr Ala Ala Glu Ala Ala Gln Val Ala Arg Leu
        755                    760                    765

gtc aga gac cgc ctg ccc tcg gct tcc tcg ctg ctc gac gtg gcc tgc    2650
Val Arg Asp Arg Leu Pro Ser Ala Ser Ser Leu Leu Asp Val Ala Cys
        770                    775                    780

ggg acc ggc acc cac ctg cgc cgg ttc gcc gac ctc ttc gac gac gtg    2698
Gly Thr Gly Thr His Leu Arg Arg Phe Ala Asp Leu Phe Asp Asp Val
785                    790                    795                    800

acc ggg ctg gag ctg tcg gcg gcg atg atc gag gtc gcc cgg ccg cag    2746
Thr Gly Leu Glu Leu Ser Ala Ala Met Ile Glu Val Ala Arg Pro Gln
                805                    810                    815

ctc ggc ggc atc ccg gtg ctg cag ggc gac atg cgc gac ttc gcg ctg    2794
Leu Gly Gly Ile Pro Val Leu Gln Gly Asp Met Arg Asp Phe Ala Leu
        820                    825                    830
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12

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gat cgc gag ttc gac gcc gtc acc tgc atg ttc agc tcc atc ggg cac   2842
Asp Arg Glu Phe Asp Ala Val Thr Cys Met Phe Ser Ser Ile Gly His
        835                     840                 845

atg cgc gac ggc gcc gag ctg gac cag gcg ctg gcg tcc ttc gcc cgc   2890
Met Arg Asp Gly Ala Glu Leu Asp Gln Ala Leu Ala Ser Phe Ala Arg
        850                     855                 860

cac ctc gcc ccc ggc ggc gtc gtg gtg gtc gaa ccg tgg tgg ttc ccg   2938
His Leu Ala Pro Gly Gly Val Val Val Val Glu Pro Trp Trp Phe Pro
865                     870                 875                 880

gag gac ttc ctc gac ggc tac gtg gcc ggt gac gtg gtg cgc gac ggc   2986
Glu Asp Phe Leu Asp Gly Tyr Val Ala Gly Asp Val Val Arg Asp Gly
                885                     890                 895

gac ctg acg atc tcg cgc gtc tcg cac tcc gtg cgc gcc ggc ggc gcg   3034
Asp Leu Thr Ile Ser Arg Val Ser His Ser Val Arg Ala Gly Gly Ala
                900                     905                 910

acc cgg atg gag atc cac tgg gtc gtg gcc gac gcg gtg aac ggt ccg   3082
Thr Arg Met Glu Ile His Trp Val Val Ala Asp Ala Val Asn Gly Pro
        915                     920                 925

cgg cac cac gtg gag cac tac gag atc acg ctc ttc gag cgg cag cag   3130
Arg His His Val Glu His Tyr Glu Ile Thr Leu Phe Glu Arg Gln Gln
        930                     935                 940

tac gag aag gcc ttc acc gcg gcc ggt tgc gct gtg cag tac ctg gag   3178
Tyr Glu Lys Ala Phe Thr Ala Ala Gly Cys Ala Val Gln Tyr Leu Glu
945                     950                 955                 960

ggc gga ccc tcc gga cgc ggg ttg ttc gtc ggt gtg cgc gga           3220
Gly Gly Pro Ser Gly Arg Gly Leu Phe Val Gly Val Arg Gly
                965                     970

tgacccgtgc gttcgcgttt tccgttcctg gcacaggtga tccgctccac gggccctttc 3280

cccgccgtga ccggaccctt acagtga gtg cgg gtc ttg atc gac aac gcc cgg 3334
                                Met Arg Val Leu Ile Asp Asn Ala Arg
                                975                 980

cgg cag caa gcg gag ccg tcg acg aca ccg cag gga gag tcg atg ggt   3382
Arg Gln Gln Ala Glu Pro Ser Thr Thr Pro Gln Gly Glu Ser Met Gly
        985                     990                 995

gat cgg acc ggc gac cgg acg att ccg gaa tcc tcg cag acc gca acg   3430
Asp Arg Thr Gly Asp Arg Thr Ile Pro Glu Ser Ser Gln Thr Ala Thr
1000                    1005                    1010                1015

cgt ttc ctg ctc ggc gac ggc gga atc ccc acc gcc acg gcg gaa acc   3478
Arg Phe Leu Leu Gly Asp Gly Gly Ile Pro Thr Ala Thr Ala Glu Thr
                1020                    1025                    1030

cac gac tgg ctg acc cgc aac ggc gcc gag cag cgg ctc gag gtg gcg   3526
His Asp Trp Leu Thr Arg Asn Gly Ala Glu Gln Arg Leu Glu Val Ala
                1035                    1040                    1045

cgc gtg ccg ttc agc gcc atg gac cgc tgg tcg ttc cag ccc gag gac   3574
Arg Val Pro Phe Ser Ala Met Asp Arg Trp Ser Phe Gln Pro Glu Asp
                1050                    1055                    1060
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ggc agg ctc gcc cac gag tcc ggg cgc ttc ttc tcc atc gag ggc ctg      3622
Gly Arg Leu Ala His Glu Ser Gly Arg Phe Phe Ser Ile Glu Gly Leu
    1065                    1070                    1075

cac gtg cgg acg aac ttc ggc tgg cgg cgg gac tgg atc cag ccc atc      3670
His Val Arg Thr Asn Phe Gly Trp Arg Arg Asp Trp Ile Gln Pro Ile
1080                    1085                    1090                    1095

atc gtg cag ccc gag atc ggc ttc ctc ggc ctc atc gtc aag gag ttc      3718
Ile Val Gln Pro Glu Ile Gly Phe Leu Gly Leu Ile Val Lys Glu Phe
                1100                    1105                    1110

gac ggt gtg ctg cac gtg ctg gcg cag gcc aag gcc gag ccg ggc aac      3766
Asp Gly Val Leu His Val Leu Ala Gln Ala Lys Ala Glu Pro Gly Asn
            1115                    1120                    1125

atc aac gcc gtc cag ctc tcc ccg acc ctg cag gcg acc cgc agc aac      3814
Ile Asn Ala Val Gln Leu Ser Pro Thr Leu Gln Ala Thr Arg Ser Asn
        1130                    1135                    1140

tac acc ggc gtc cac cgc ggc tcg aag gtc cgg ttc atc gag tac ttc      3862
Tyr Thr Gly Val His Arg Gly Ser Lys Val Arg Phe Ile Glu Tyr Phe
    1145                    1150                    1155

aac ggc acg cgc ccg agc cgg atc ctc gtc gac gtg ctc cag tcc gag      3910
Asn Gly Thr Arg Pro Ser Arg Ile Leu Val Asp Val Leu Gln Ser Glu
1160                    1165                    1170                    1175

cag ggc gcg tgg ttc ctg cgc aag cgc aac cgg aac atg gtc gtc gag      3958
Gln Gly Ala Trp Phe Leu Arg Lys Arg Asn Arg Asn Met Val Val Glu
                1180                    1185                    1190

gtg ttc gac gac ctg ccc gag cac ccg aac ttc cgg tgg ctg acc gtc      4006
Val Phe Asp Asp Leu Pro Glu His Pro Asn Phe Arg Trp Leu Thr Val
            1195                    1200                    1205

gcg cag ctg cgg gcg atg ctg cac cac gac aac gtg gtg aac atg gac      4054
Ala Gln Leu Arg Ala Met Leu His His Asp Asn Val Val Asn Met Asp
        1210                    1215                    1220

ctg cgc acc gtg ctg gcc tgc gtc ccg acc gcc gtg gag cgg gac cgg      4102
Leu Arg Thr Val Leu Ala Cys Val Pro Thr Ala Val Glu Arg Asp Arg
    1225                    1230                    1235

gcc gac gac gtg ctc gcg cgc ctg ccc gag ggc tcg ttc cag gcc cgg      4150
Ala Asp Asp Val Leu Ala Arg Leu Pro Glu Gly Ser Phe Gln Ala Arg
1240                    1245                    1250                    1255

ctg ctg cac tcg ttc atc ggc gcg ggc acc ccg gcc aac aac atg aac      4198
Leu Leu His Ser Phe Ile Gly Ala Gly Thr Pro Ala Asn Asn Met Asn
                1260                    1265                    1270

agc ctg ctg agc tgg atc tcc gac gtg cgc gcc agg cgc gag ttc gtg      4246
Ser Leu Leu Ser Trp Ile Ser Asp Val Arg Ala Arg Arg Glu Phe Val
            1275                    1280                    1285

cag cgc ggc cgc ccg ctg ccc gac atc gag cgc agc ggg tgg atc cgc      4294
Gln Arg Gly Arg Pro Leu Pro Asp Ile Glu Arg Ser Gly Trp Ile Arg
        1290                    1295                    1300
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14

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cgc gac gac ggc atc gag cac gag gag aag aag tac ttc gac gtc ttc    4342
Arg Asp Asp Gly Ile Glu His Glu Glu Lys Lys Tyr Phe Asp Val Phe
   1305              1310              1315

ggc gtc acg gtg gcg acc agc gac cgc gag gtc aac tcg tgg atg cag    4390
Gly Val Thr Val Ala Thr Ser Asp Arg Glu Val Asn Ser Trp Met Gln
1320              1325              1330              1335

ccg ctg ctc tcg ccc gcc aac aac ggc ctg ctc gcc ctg ctg gtc aag    4438
Pro Leu Leu Ser Pro Ala Asn Asn Gly Leu Leu Ala Leu Leu Val Lys
              1340              1345              1350

gac atc ggc ggc acg ttg cac gcg ctc gtg cag ctg cgc acc gag gcg    4486
Asp Ile Gly Gly Thr Leu His Ala Leu Val Gln Leu Arg Thr Glu Ala
          1355              1360              1365

ggc ggg atg gac gtc gcc gag ctg gcg cct acg gtg cac tgc cag ccc    4534
Gly Gly Met Asp Val Ala Glu Leu Ala Pro Thr Val His Cys Gln Pro
          1370              1375              1380

gac aac tac gcc gac gcg ccc gag gag ttc cga ccg gcc tat gtg gac    4582
Asp Asn Tyr Ala Asp Ala Pro Glu Glu Phe Arg Pro Ala Tyr Val Asp
   1385              1390              1395

tac gtg ttg aac gtg ccg cgc tcg cag gtc cgc tac gac gca tgg cac    4630
Tyr Val Leu Asn Val Pro Arg Ser Gln Val Arg Tyr Asp Ala Trp His
1400              1405              1410              1415

tcc gag gag ggc ggc cgg ttc tac cgc aac gag aac cgg tac atg ctg    4678
Ser Glu Glu Gly Gly Arg Phe Tyr Arg Asn Glu Asn Arg Tyr Met Leu
              1420              1425              1430

atc gag gtg ccc gcc gac ttc gac gcc agt gcc gct ccc gac cac cgg    4726
Ile Glu Val Pro Ala Asp Phe Asp Ala Ser Ala Ala Pro Asp His Arg
              1435              1440              1445

tgg atg acc ttc gac cag atc acc tac ctg ctc ggg cac agc cac tac    4774
Trp Met Thr Phe Asp Gln Ile Thr Tyr Leu Leu Gly His Ser His Tyr
          1450              1455              1460

gtc aac atc cag ctg cgc agc atc atc gcg tgc gcc tcg gcc gtc tac    4822
Val Asn Ile Gln Leu Arg Ser Ile Ile Ala Cys Ala Ser Ala Val Tyr
   1465              1470              1475

acc agg acc gcc gga tgaaacgcgc gctgaccgac ctggcgatct cggcggccc    4877
Thr Arg Thr Ala Gly
1480

cgaggcattc ctgcacaccc tctacgtggg caggccgacc gtcggggacc gggagcggtt    4937

cttcgcccgc ctggagtggg cgctgaacaa caactggctg accaacggcg gaccactggt    4997

gcgcgagttc gagggccggg tcgccgacct ggcgggtgtc cgccactgcg tggccacctg    5057

caacgcgacg gtcgcgctgc aactggtgct gcgcgcgagc gacgtgtccg gcgaggtcgt    5117

catgccttcg atgacgttcg cggccaccgc gcacgcggcg agctggctgg ggctggaacc    5177

ggtgttctgc gacgtggacc ccgagaccgg cctgctcgac cccgagcacg tcgcgtcgct    5237

ggtgacaccg cggacgggcg cgatcatcgg cgtgcacctg tggggcaggc ccgctccggt    5297
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15

559629_1

cgaggcgctg gagaagatcg ccgccgagca ccaggtcaaa ctcttcttcg acgccgcgca 5357

cgcgctgggc tgcaccgccg gcgggcggcc ggtcggcgcc ttcggcaacg ccgaggtgtt 5417

cagcttccac gccacgaagg cggtcacctc gttcgagggc ggcgccatcg tcaccgacga 5477

cgggctgctg gccgaccgca tccgcgccat gcacaacttc gggatcgcac cggacaagct 5537

ggtgaccgat gtcggcacca acggcaagat gagcgagtgc gccgcggcga tgggcctcac 5597

ctcgctcgac gccttcgccg agaccagggt gcacaaccgc ctcaaccacg cgctctactc 5657

cgacgagctc cgcgacgtgc gcggcatatc cgtgcacgcg ttcgatcctg cgagcagaa 5717

caactaccag tacgtgatca tctcggtgga ctccgcggcc accggcatcg accgcgacca 5777

gttgcaggcg atcctgcgag cggagaaggt tgtggcacaa ccctacttct cccccgggtg 5837

ccaccagatg cagccgtacc ggaccgagcc gccgctgcgg ctggagaaca ccgaacagct 5897

ctccgaccgg gtgctcgcgc tgcccaccgg ccccgcggtg tccagcgagg acatccggcg 5957

ggtgtgcgac atcatccggc tcgccgccac cagcggcgag ctgatcaacg cgcaatggga 6017

ccagaggacg cgcaacggtt cgtgacgacc tgcgccacaa gtgccaggag gttcgctccc 6077

cg atg aac aca act cgt acg gca acc gcc cag gaa gcg ggg gtc gcc   6124
   Met Asn Thr Thr Arg Thr Ala Thr Ala Gln Glu Ala Gly Val Ala
   1485   1490   1495

gac gcg gcg cgc ccg gac gtc gac cgg cgg gcg gtc gtg cgg gcg ctg   6172
Asp Ala Ala Arg Pro Asp Val Asp Arg Arg Ala Val Val Arg Ala Leu
1500   1505   1510   1515

agc tcg gag gtc tcc cgc gtc acc ggc gcc ggt gac ggt gac gcc gac   6220
Ser Ser Glu Val Ser Arg Val Thr Gly Ala Gly Asp Gly Asp Ala Asp
             1520   1525   1530

gtg cag gcc gcc cgg ctc gcc gac ctc gcc gcg cac tac ggg gcg cac   6268
Val Gln Ala Ala Arg Leu Ala Asp Leu Ala Ala His Tyr Gly Ala His
         1535   1540   1545

ccg ttc acg ccg ctg gag cag acg cgt gcg cgg ctc ggc ctg gac cgc   6316
Pro Phe Thr Pro Leu Glu Gln Thr Arg Ala Arg Leu Gly Leu Asp Arg
         1550   1555   1560

gcg gag ttc gcc cac ctg ctc gac ctg ttc ggc cgc atc ccg gac ctg   6364
Ala Glu Phe Ala His Leu Leu Asp Leu Phe Gly Arg Ile Pro Asp Leu
1565   1570   1575

ggc acc gcg gtg gag cac ggt ccg gcg ggc aag tac tgg tcc aac acg   6412
Gly Thr Ala Val Glu His Gly Pro Ala Gly Lys Tyr Trp Ser Asn Thr
1580   1585   1590   1595

atc aag ccg ctg gac gcc gca ggc gca ctg gac gcg gcg gtc tac cgc   6460
Ile Lys Pro Leu Asp Ala Ala Gly Ala Leu Asp Ala Ala Val Tyr Arg
             1600   1605   1610

aag cct gcc ttc ccc tac agc gtc ggc ctg tac ccc ggg ccg acg tgc   6508
Lys Pro Ala Phe Pro Tyr Ser Val Gly Leu Tyr Pro Gly Pro Thr Cys

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atg ttc cgc tgc cac ttc tgc gtg cgg gtg acc ggt gcc cgc tac gag    6556
Met Phe Arg Cys His Phe Cys Val Arg Val Thr Gly Ala Arg Tyr Glu
        1630                1635                1640

gcc gca tcg gtc ccg gcg ggc aac gag acg ctg gcc gcg atc atc gac    6604
Ala Ala Ser Val Pro Ala Gly Asn Glu Thr Leu Ala Ala Ile Ile Asp
    1645                1650                1655

gag gtg ccc acg gac aac ccg aag gcg atg tac atg tcg ggc ggg ctc    6652
Glu Val Pro Thr Asp Asn Pro Lys Ala Met Tyr Met Ser Gly Gly Leu
1660                1665                1670                1675

gag ccg ctg acc aac ccc ggt ctc ggc gag ctg gtg tcg cac gcc gcc    6700
Glu Pro Leu Thr Asn Pro Gly Leu Gly Glu Leu Val Ser His Ala Ala
                1680                1685                1690

ggg cgc ggt ttc gac ctc acc gtc tac acc aac gcc ttc gcc ctc acc    6748
Gly Arg Gly Phe Asp Leu Thr Val Tyr Thr Asn Ala Phe Ala Leu Thr
        1695                1700                1705

gag cag acg ctg aac cgc cag ccc ggc ctg tgg gag ctg ggc gcg atc    6796
Glu Gln Thr Leu Asn Arg Gln Pro Gly Leu Trp Glu Leu Gly Ala Ile
        1710                1715                1720

cgc acg tcc ctc tac ggg ctg aac aac gac gag tac gag acg acc acc    6844
Arg Thr Ser Leu Tyr Gly Leu Asn Asn Asp Glu Tyr Glu Thr Thr Thr
    1725                1730                1735

ggc aag cgc ggc gct ttc gaa cgc gtc aag aag aac ctg cag ggc ttc    6892
Gly Lys Arg Gly Ala Phe Glu Arg Val Lys Lys Asn Leu Gln Gly Phe
1740                1745                1750                1755

ctg cgg atg cgc gcc gag cgg gac gcg ccg atc cgg ctc ggc ttc aac    6940
Leu Arg Met Arg Ala Glu Arg Asp Ala Pro Ile Arg Leu Gly Phe Asn
                1760                1765                1770

cac atc atc ctg ccg gga cgg gcc gac cgg ctc acc gac ctc gtc gac    6988
His Ile Ile Leu Pro Gly Arg Ala Asp Arg Leu Thr Asp Leu Val Asp
        1775                1780                1785

ttc atc gcc gag ctc aac gag tcc agc ccg caa cgg ccg ctg gac ttc    7036
Phe Ile Ala Glu Leu Asn Glu Ser Ser Pro Gln Arg Pro Leu Asp Phe
        1790                1795                1800

gtg acg gtg cgc gag gac tac agc ggc cgc gac gac ggc cgg ctg tcg    7084
Val Thr Val Arg Glu Asp Tyr Ser Gly Arg Asp Asp Gly Arg Leu Ser
    1805                1810                1815

gac tcc gag cgc aac gag ctg cgc gag ggc ctg gtg cgg ttc gtc gac    7132
Asp Ser Glu Arg Asn Glu Leu Arg Glu Gly Leu Val Arg Phe Val Asp
1820                1825                1830                1835

tac gcc gcc gag cgg acc ccg ggc atg cac atc gac ctg ggc tac gcc    7180
Tyr Ala Ala Glu Arg Thr Pro Gly Met His Ile Asp Leu Gly Tyr Ala
            1840                1845                1850

ctg gag agc ctg cgg cgg ggt gtg gac gcc gag ctg ctg cgc atc cgg    7228
Leu Glu Ser Leu Arg Arg Gly Val Asp Ala Glu Leu Leu Arg Ile Arg
        1855                1860                1865
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ccg gag acg atg cgt ccc acc gcg cac ccc cag gtc gcg gtg cag atc     7276
Pro Glu Thr Met Arg Pro Thr Ala His Pro Gln Val Ala Val Gln Ile
        1870                    1875                1880

gac ctg ctc ggc gac gtc tac ctc tac cgc gag gcg ggc ttc ccg gag     7324
Asp Leu Leu Gly Asp Val Tyr Leu Tyr Arg Glu Ala Gly Phe Pro Glu
    1885                    1890                1895

ctg gag ggc gcc acc cgc tac atc gcg ggc cgg gtc acc ccg tcg acc     7372
Leu Glu Gly Ala Thr Arg Tyr Ile Ala Gly Arg Val Thr Pro Ser Thr
1900                1905                    1910                1915

agc ctg cgc gag gtg gtg gag aac ttc gtg ctg gag aac gag ggc gtg     7420
Ser Leu Arg Glu Val Val Glu Asn Phe Val Leu Glu Asn Glu Gly Val
                1920                    1925                1930

cag ccc cgc ccc ggc gac gag tac ttc ctc gac ggc ttc gac cag tcg     7468
Gln Pro Arg Pro Gly Asp Glu Tyr Phe Leu Asp Gly Phe Asp Gln Ser
            1935                    1940                1945

gtg acc gca cgg ctc aac cag ctc gaa cga gac atc gcc gac ggg tgg     7516
Val Thr Ala Arg Leu Asn Gln Leu Glu Arg Asp Ile Ala Asp Gly Trp
        1950                    1955                1960

gag gac cac cgc ggc ttc ctg cgc gga agg tgaaccggag ttgcgagtac       7566
Glu Asp His Arg Gly Phe Leu Arg Gly Arg
        1965                    1970

gtgagctggc g gtg gcg ggc ggt ttc gag ttc acc ccc gac ccg aag cag    7616
             Met Ala Gly Gly Phe Glu Phe Thr Pro Asp Pro Lys Gln
              1975                    1980                1985

gac cgg cgg ggc ctg ttc gtg tct ccg ctg cag gac gag gcg ttc gtg     7664
Asp Arg Arg Gly Leu Phe Val Ser Pro Leu Gln Asp Glu Ala Phe Val
        1990                    1995                2000

ggc gcg gtg ggc cat cgg ttc ccc gtc gcc cag atg aac cac atc gtc     7712
Gly Ala Val Gly His Arg Phe Pro Val Ala Gln Met Asn His Ile Val
        2005                    2010                2015

tcc gcc cgg ggc gtg ctg cgc ggg ctg cac ttc acc acc acc ccg ccg     7760
Ser Ala Arg Gly Val Leu Arg Gly Leu His Phe Thr Thr Thr Pro Pro
    2020                    2025                    2030

ggg cag tgc aag tac gtc tac tgc gcg cgc ggc cgg gcg ctc gac gtc     7808
Gly Gln Cys Lys Tyr Val Tyr Cys Ala Arg Gly Arg Ala Leu Asp Val
2035                2040                    2045                2050

atc gtc gac atc cgg gtc ggc tcg ccg acg ttc ggg aag tgg gac gcg     7856
Ile Val Asp Ile Arg Val Gly Ser Pro Thr Phe Gly Lys Trp Asp Ala
            2055                    2060                2065

gtg gag atg gac acc gag cac ttc cgg gcg gtc tac ttc ccc agg ggc     7904
Val Glu Met Asp Thr Glu His Phe Arg Ala Val Tyr Phe Pro Arg Gly
        2070                    2075                2080

acc gcg cac gcc ttc ctc gcg ctt gag gac gac acc ctg atg tcg tac     7952
Thr Ala His Ala Phe Leu Ala Leu Glu Asp Asp Thr Leu Met Ser Tyr
        2085                    2090                2095
```

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```
ctg gtc agc acg ccg tac gtg gcc gag tac gag cag gcg atc gac ccg        8000
Leu Val Ser Thr Pro Tyr Val Ala Glu Tyr Glu Gln Ala Ile Asp Pro
    2100                2105                2110

ttc gac ccc gcg ctg ggt ctg ccg tgg ccc gcg gac ctg gag gtc gtg        8048
Phe Asp Pro Ala Leu Gly Leu Pro Trp Pro Ala Asp Leu Glu Val Val
2115                2120                2125                2130

ctc tcc gac cgc gac acg gtg gcc gtg gac ctg gag acc gcc agg cgg        8096
Leu Ser Asp Arg Asp Thr Val Ala Val Asp Leu Glu Thr Ala Arg Arg
                2135                2140                2145

cga ggg atg ctg ccc gac tac gcc gac tgc ctc ggc gag gag ccc gcc        8144
Arg Gly Met Leu Pro Asp Tyr Ala Asp Cys Leu Gly Glu Glu Pro Ala
            2150                2155                2160

agc acc ggc agg tgac                                                    8160
Ser Thr Gly Arg
        2165


<210> 7
<211> 322
<212> PRT
<213>


<400> 7
Met Asn Gly Ile Ser Asp Ser Pro Arg Gln Leu Ile Thr Leu Leu Gly
 1               5                   10                  15

Ala Ser Gly Phe Val Gly Ser Ala Val Leu Arg Glu Leu Arg Asp His
            20                  25                  30

Pro Val Arg Leu Arg Ala Val Ser Arg Gly Gly Ala Pro Ala Val Pro
        35                  40                  45

Pro Gly Ala Ala Glu Val Glu Asp Leu Arg Ala Asp Leu Leu Glu Pro
    50                  55                  60

Gly Arg Ala Ala Ala Ala Ile Glu Asp Ala Asp Val Ile Val His Leu
65                  70                  75                  80

Val Ala His Ala Ala Gly Gly Ser Thr Trp Arg Ser Ala Thr Ser Asp
                85                  90                  95

Pro Glu Ala Glu Arg Val Asn Val Gly Leu Met His Asp Leu Val Gly
            100                 105                 110

Ala Leu His Asp Arg Arg Arg Ser Thr Pro Pro Val Leu Leu Tyr Ala
        115                 120                 125

Ser Thr Ala Gln Ala Ala Asn Pro Ser Ala Ala Ser Arg Tyr Ala Gln
    130                 135                 140

Gln Lys Thr Glu Ala Glu Arg Ile Leu Arg Lys Ala Thr Asp Glu Gly
145                 150                 155                 160

Arg Val Arg Gly Val Ile Leu Arg Leu Pro Ala Val Tyr Gly Gln Ser
                165                 170                 175
```

Gly Pro Ser Gly Pro Met Gly Arg Gly Val Val Ala Ala Met Ile Arg
            180   185   190

Arg Ala Leu Ala Gly Glu Pro Leu Thr Met Trp His Asp Gly Gly Val
            195   200   205

Arg Arg Asp Leu Leu His Val Glu Asp Val Ala Thr Ala Phe Ala Ala
    210   215   220

Ala Leu Glu His His Asp Ala Leu Ala Gly Gly Thr Trp Ala Leu Gly
225   230   235   240

Ala Asp Arg Ser Glu Pro Leu Gly Asp Ile Phe Arg Ala Val Ser Gly
            245   250   255

Ser Val Ala Arg Gln Thr Gly Ser Pro Ala Val Asp Val Val Thr Val
            260   265   270

Pro Ala Pro Glu His Ala Glu Ala Asn Asp Phe Arg Ser Asp Asp Ile
            275   280   285

Asp Ser Thr Glu Phe Arg Ser Arg Thr Gly Trp Arg Pro Arg Val Ser
    290   295   300

Leu Thr Asp Gly Ile Asp Arg Thr Val Ala Ala Leu Thr Pro Thr Glu
305   310   315   320

Glu His

<210> 8
<211> 415
<212> PRT
<213>

<400> 8
Met Arg Val Leu Leu Thr Ser Phe Ala His Arg Thr His Phe Gln Gly
  1   5   10   15

Leu Val Pro Leu Ala Trp Ala Leu Arg Thr Ala Gly His Asp Val Arg
            20   25   30

Val Ala Ala Gln Pro Ala Leu Thr Asp Ala Val Ile Gly Ala Gly Leu
        35   40   45

Thr Ala Val Pro Val Gly Ser Asp His Arg Leu Phe Asp Ile Val Pro
    50   55   60

Glu Val Ala Ala Gln Val His Arg Tyr Ser Phe Tyr Leu Asp Phe Tyr
65   70   75   80

His Arg Glu Gln Glu Leu His Ser Trp Glu Phe Leu Leu Gly Met Gln
                85   90   95

Glu Ala Thr Ser Arg Trp Val Tyr Pro Val Val Asn Asn Asp Ser Phe
            100   105   110

Val Ala Glu Leu Val Asp Phe Ala Arg Asp Trp Arg Pro Asp Leu Val
            115   120   125

Leu Trp Glu Pro Phe Thr Phe Ala Gly Ala Val Ala Ala Arg Ala Cys
    130   135   140

```
Gly Ala Ala His Ala Arg Leu Leu Trp Gly Ser Asp Leu Thr Gly Tyr
145                 150                 155                 160

Phe Arg Gly Arg Phe Gln Ala Gln Arg Leu Arg Arg Pro Pro Glu Asp
                165                 170                 175

Arg Pro Asp Pro Leu Gly Thr Trp Leu Thr Glu Val Ala Gly Arg Phe
                180                 185                 190

Gly Val Glu Phe Gly Glu Asp Leu Ala Val Gly Gln Trp Ser Val Asp
            195                 200                 205

Gln Leu Pro Pro Ser Phe Arg Leu Asp Thr Gly Met Glu Thr Val Val
    210                 215                 220

Ala Arg Thr Leu Pro Tyr Asn Gly Ala Ser Val Val Pro Asp Trp Leu
225                 230                 235                 240

Lys Lys Gly Ser Ala Thr Arg Arg Ile Cys Ile Thr Gly Gly Phe Ser
                245                 250                 255

Gly Leu Gly Leu Ala Ala Asp Ala Asp Gln Phe Ala Arg Thr Leu Ala
            260                 265                 270

Gln Leu Ala Arg Phe Asp Gly Glu Ile Val Val Thr Gly Ser Gly Pro
    275                 280                 285

Asp Thr Ser Ala Val Pro Asp Asn Ile Arg Leu Val Asp Phe Val Pro
    290                 295                 300

Met Gly Val Leu Leu Gln Asn Cys Ala Ala Ile Ile His His Gly Gly
305                 310                 315                 320

Ala Gly Thr Trp Ala Thr Ala Leu His His Gly Ile Pro Gln Ile Ser
                325                 330                 335

Val Ala His Glu Trp Asp Cys Met Leu Arg Gly Gln Gln Thr Ala Glu
            340                 345                 350

Leu Gly Ala Gly Ile Tyr Leu Arg Pro Asp Glu Val Asp Ala Asp Ser
            355                 360                 365

Leu Ala Ser Ala Leu Thr Gln Val Val Glu Asp Pro Thr Tyr Thr Glu
    370                 375                 380

Asn Ala Val Lys Leu Arg Glu Glu Ala Leu Ser Asp Pro Thr Pro Gln
385                 390                 395                 400

Glu Ile Val Pro Arg Leu Glu Glu Leu Thr Arg Arg His Ala Gly
                405                 410                 415


<210> 9
<211> 237
<212> PRT
<213>

<400> 9
Met Tyr Glu Gly Gly Phe Ala Glu Leu Tyr Asp Arg Phe Tyr Arg Gly
    1               5                   10                  15
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21

```
Arg Gly Lys Asp Tyr Ala Ala Glu Ala Ala Gln Val Ala Arg Leu Val
         20              25                30

Arg Asp Arg Leu Pro Ser Ala Ser Ser Leu Leu Asp Val Ala Cys Gly
         35              40                45

Thr Gly Thr His Leu Arg Arg Phe Ala Asp Leu Phe Asp Asp Val Thr
    50              55                60

Gly Leu Glu Leu Ser Ala Ala Met Ile Glu Val Ala Arg Pro Gln Leu
65              70                75                        80

Gly Gly Ile Pro Val Leu Gln Gly Asp Met Arg Asp Phe Ala Leu Asp
             85                90                    95

Arg Glu Phe Asp Ala Val Thr Cys Met Phe Ser Ser Ile Gly His Met
         100             105               110

Arg Asp Gly Ala Glu Leu Asp Gln Ala Leu Ala Ser Phe Ala Arg His
         115             120               125

Leu Ala Pro Gly Gly Val Val Val Val Glu Pro Trp Trp Phe Pro Glu
    130             135               140

Asp Phe Leu Asp Gly Tyr Val Ala Gly Asp Val Val Arg Asp Gly Asp
145             150               155               160

Leu Thr Ile Ser Arg Val Ser His Ser Val Arg Ala Gly Gly Ala Thr
             165               170               175

Arg Met Glu Ile His Trp Val Val Ala Asp Ala Val Asn Gly Pro Arg
         180             185               190

His His Val Glu His Tyr Glu Ile Thr Leu Phe Glu Arg Gln Gln Tyr
         195             200               205

Glu Lys Ala Phe Thr Ala Ala Gly Cys Ala Val Gln Tyr Leu Glu Gly
    210             215               220

Gly Pro Ser Gly Arg Gly Leu Phe Val Gly Val Arg Gly
225             230               235


<210> 10
<211> 510
<212> PRT
<213>

<400> 10
Met Arg Val Leu Ile Asp Asn Ala Arg Arg Gln Gln Ala Glu Pro Ser
  1           5               10                15

Thr Thr Pro Gln Gly Glu Ser Met Gly Asp Arg Thr Gly Asp Arg Thr
         20              25                30

Ile Pro Glu Ser Ser Gln Thr Ala Thr Arg Phe Leu Leu Gly Asp Gly
         35              40                45

Gly Ile Pro Thr Ala Thr Ala Glu Thr His Asp Trp Leu Thr Arg Asn
    50              55                60
```

Gly Ala Glu Gln Arg Leu Glu Val Ala Arg Val Pro Phe Ser Ala Met
65   70   75   80

Asp Arg Trp Ser Phe Gln Pro Glu Asp Gly Arg Leu Ala His Glu Ser
                85   90   95

Gly Arg Phe Phe Ser Ile Glu Gly Leu His Val Arg Thr Asn Phe Gly
            100   105   110

Trp Arg Arg Asp Trp Ile Gln Pro Ile Ile Val Gln Pro Glu Ile Gly
        115   120   125

Phe Leu Gly Leu Ile Val Lys Glu Phe Asp Gly Val Leu His Val Leu
    130   135   140

Ala Gln Ala Lys Ala Glu Pro Gly Asn Ile Asn Ala Val Gln Leu Ser
145   150   155   160

Pro Thr Leu Gln Ala Thr Arg Ser Asn Tyr Thr Gly Val His Arg Gly
            165   170   175

Ser Lys Val Arg Phe Ile Glu Tyr Phe Asn Gly Thr Arg Pro Ser Arg
            180   185   190

Ile Leu Val Asp Val Leu Gln Ser Glu Gln Gly Ala Trp Phe Leu Arg
        195   200   205

Lys Arg Asn Arg Asn Met Val Val Glu Val Phe Asp Asp Leu Pro Glu
    210   215   220

His Pro Asn Phe Arg Trp Leu Thr Val Ala Gln Leu Arg Ala Met Leu
225   230   235   240

His His Asp Asn Val Val Asn Met Asp Leu Arg Thr Val Leu Ala Cys
            245   250   255

Val Pro Thr Ala Val Glu Arg Asp Arg Ala Asp Asp Val Leu Ala Arg
            260   265   270

Leu Pro Glu Gly Ser Phe Gln Ala Arg Leu Leu His Ser Phe Ile Gly
        275   280   285

Ala Gly Thr Pro Ala Asn Asn Met Asn Ser Leu Leu Ser Trp Ile Ser
    290   295   300

Asp Val Arg Ala Arg Arg Glu Phe Val Gln Arg Gly Arg Pro Leu Pro
305   310   315   320

Asp Ile Glu Arg Ser Gly Trp Ile Arg Arg Asp Asp Gly Ile Glu His
            325   330   335

Glu Glu Lys Lys Tyr Phe Asp Val Phe Gly Val Thr Val Ala Thr Ser
            340   345   350

Asp Arg Glu Val Asn Ser Trp Met Gln Pro Leu Leu Ser Pro Ala Asn
        355   360   365

Asn Gly Leu Leu Ala Leu Leu Val Lys Asp Ile Gly Gly Thr Leu His
    370   375   380

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```
Ala Leu Val Gln Leu Arg Thr Glu Ala Gly Gly Met Asp Val Ala Glu
385             390             395             400

Leu Ala Pro Thr Val His Cys Gln Pro Asp Asn Tyr Ala Asp Ala Pro
            405             410             415

Glu Glu Phe Arg Pro Ala Tyr Val Asp Tyr Val Leu Asn Val Pro Arg
            420             425             430

Ser Gln Val Arg Tyr Asp Ala Trp His Ser Glu Glu Gly Gly Arg Phe
            435             440             445

Tyr Arg Asn Glu Asn Arg Tyr Met Leu Ile Glu Val Pro Ala Asp Phe
    450             455             460

Asp Ala Ser Ala Ala Pro Asp His Arg Trp Met Thr Phe Asp Gln Ile
465             470             475             480

Thr Tyr Leu Leu Gly His Ser His Tyr Val Asn Ile Gln Leu Arg Ser
            485             490             495

Ile Ile Ala Cys Ala Ser Ala Val Tyr Thr Arg Thr Ala Gly
            500             505             510

<210> 11
<211> 489
<212> PRT
<213>

<400> 11
Met Asn Thr Thr Arg Thr Ala Thr Ala Gln Glu Ala Gly Val Ala Asp
  1             5               10              15

Ala Ala Arg Pro Asp Val Asp Arg Arg Ala Val Val Arg Ala Leu Ser
            20              25              30

Ser Glu Val Ser Arg Val Thr Gly Ala Gly Asp Gly Asp Ala Asp Val
        35              40              45

Gln Ala Ala Arg Leu Ala Asp Leu Ala Ala His Tyr Gly Ala His Pro
    50              55              60

Phe Thr Pro Leu Glu Gln Thr Arg Ala Arg Leu Gly Leu Asp Arg Ala
65              70              75              80

Glu Phe Ala His Leu Leu Asp Leu Phe Gly Arg Ile Pro Asp Leu Gly
            85              90              95

Thr Ala Val Glu His Gly Pro Ala Gly Lys Tyr Trp Ser Asn Thr Ile
            100             105             110

Lys Pro Leu Asp Ala Ala Gly Ala Leu Asp Ala Ala Val Tyr Arg Lys
            115             120             125

Pro Ala Phe Pro Tyr Ser Val Gly Leu Tyr Pro Gly Pro Thr Cys Met
            130             135             140

Phe Arg Cys His Phe Cys Val Arg Val Thr Gly Ala Arg Tyr Glu Ala
145             150             155             160

Ala Ser Val Pro Ala Gly Asn Glu Thr Leu Ala Ala Ile Ile Asp Glu
```

24

```
                    165                      170                      175
Val Pro Thr Asp Asn Pro Lys Ala Met Tyr Met Ser Gly Gly Leu Glu
        180                  185                  190

Pro Leu Thr Asn Pro Gly Leu Gly Glu Leu Val Ser His Ala Ala Gly
        195                  200                  205

Arg Gly Phe Asp Leu Thr Val Tyr Thr Asn Ala Phe Ala Leu Thr Glu
        210                  215                  220

Gln Thr Leu Asn Arg Gln Pro Gly Leu Trp Glu Leu Gly Ala Ile Arg
225                      230                  235                  240

Thr Ser Leu Tyr Gly Leu Asn Asn Asp Glu Tyr Glu Thr Thr Thr Gly
            245                  250                  255

Lys Arg Gly Ala Phe Glu Arg Val Lys Lys Asn Leu Gln Gly Phe Leu
        260                  265                  270

Arg Met Arg Ala Glu Arg Asp Ala Pro Ile Arg Leu Gly Phe Asn His
        275                  280                  285

Ile Ile Leu Pro Gly Arg Ala Asp Arg Leu Thr Asp Leu Val Asp Phe
    290                  295                  300

Ile Ala Glu Leu Asn Glu Ser Ser Pro Gln Arg Pro Leu Asp Phe Val
305                      310                  315                  320

Thr Val Arg Glu Asp Tyr Ser Gly Arg Asp Asp Gly Arg Leu Ser Asp
            325                  330                  335

Ser Glu Arg Asn Glu Leu Arg Glu Gly Leu Val Arg Phe Val Asp Tyr
            340                  345                  350

Ala Ala Glu Arg Thr Pro Gly Met His Ile Asp Leu Gly Tyr Ala Leu
        355                  360                  365

Glu Ser Leu Arg Arg Gly Val Asp Ala Glu Leu Leu Arg Ile Arg Pro
    370                  375                  380

Glu Thr Met Arg Pro Thr Ala His Pro Gln Val Ala Val Gln Ile Asp
385                  390                  395                  400

Leu Leu Gly Asp Val Tyr Leu Tyr Arg Glu Ala Gly Phe Pro Glu Leu
            405                  410                  415

Glu Gly Ala Thr Arg Tyr Ile Ala Gly Arg Val Thr Pro Ser Thr Ser
        420                  425                  430

Leu Arg Glu Val Val Glu Asn Phe Val Leu Glu Asn Glu Gly Val Gln
        435                  440                  445

Pro Arg Pro Gly Asp Glu Tyr Phe Leu Asp Gly Phe Asp Gln Ser Val
    450                  455                  460

Thr Ala Arg Leu Asn Gln Leu Glu Arg Asp Ile Ala Asp Gly Trp Glu
465                  470                  475                  480

Asp His Arg Gly Phe Leu Arg Gly Arg
            485
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25

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<210> 12
<211> 193
<212> PRT
<213>

<400> 12
Met Ala Gly Gly Phe Glu Phe Thr Pro Asp Pro Lys Gln Asp Arg Arg
 1               5                   10                  15

Gly Leu Phe Val Ser Pro Leu Gln Asp Glu Ala Phe Val Gly Ala Val
                20                  25                  30

Gly His Arg Phe Pro Val Ala Gln Met Asn His Ile Val Ser Ala Arg
            35                  40                  45

Gly Val Leu Arg Gly Leu His Phe Thr Thr Thr Pro Pro Gly Gln Cys
        50                  55                  60

Lys Tyr Val Tyr Cys Ala Arg Gly Arg Ala Leu Asp Val Ile Val Asp
65                  70                  75                  80

Ile Arg Val Gly Ser Pro Thr Phe Gly Lys Trp Asp Ala Val Glu Met
                85                  90                  95

Asp Thr Glu His Phe Arg Ala Val Tyr Phe Pro Arg Gly Thr Ala His
            100                 105                 110

Ala Phe Leu Ala Leu Glu Asp Asp Thr Leu Met Ser Tyr Leu Val Ser
        115                 120                 125

Thr Pro Tyr Val Ala Glu Tyr Glu Gln Ala Ile Asp Pro Phe Asp Pro
    130                 135                 140

Ala Leu Gly Leu Pro Trp Pro Ala Asp Leu Glu Val Val Leu Ser Asp
145                 150                 155                 160

Arg Asp Thr Val Ala Val Asp Leu Glu Thr Ala Arg Arg Arg Gly Met
                165                 170                 175

Leu Pro Asp Tyr Ala Asp Cys Leu Gly Glu Glu Pro Ala Ser Thr Gly
            180                 185                 190

Arg


<210> 13
<211> 1206
<212> DNA
<213> Saccharopolyspora erythraea

<220>
<221> CDS
<222> (1)..(1203)
<223> /function= "involved in the biosynthesis of
      desosamine" /gene= "eryCIV" /note= "SEQ ID No 6
      from 4837 to 6039"

<220>
<221> mat_peptide
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<222> (1)

<400> 13
atg aaa cgc gcg ctg acc gac ctg gcg atc ttc ggc ggc ccc gag gca   48
Met Lys Arg Ala Leu Thr Asp Leu Ala Ile Phe Gly Gly Pro Glu Ala
 1   5   10   15

ttc ctg cac acc ctc tac gtg ggc agg ccg acc gtc ggg gac cgg gag   96
Phe Leu His Thr Leu Tyr Val Gly Arg Pro Thr Val Gly Asp Arg Glu
             20   25   30

cgg ttc ttc gcc cgc ctg gag tgg gcg ctg aac aac aac tgg ctg acc   144
Arg Phe Phe Ala Arg Leu Glu Trp Ala Leu Asn Asn Asn Trp Leu Thr
         35   40   45

aac ggc gga cca ctg gtg cgc gag ttc gag ggc cgg gtc gcc gac ctg   192
Asn Gly Gly Pro Leu Val Arg Glu Phe Glu Gly Arg Val Ala Asp Leu
     50   55   60

gcg ggt gtc cgc cac tgc gtg gcc acc tgc aac gcg acg gtc gcg ctg   240
Ala Gly Val Arg His Cys Val Ala Thr Cys Asn Ala Thr Val Ala Leu
65   70   75   80

caa ctg gtg ctg cgc gcg agc gac gtg tcc ggc gag gtc gtc atg cct   288
Gln Leu Val Leu Arg Ala Ser Asp Val Ser Gly Glu Val Val Met Pro
                 85   90   95

tcg atg acg ttc gcg gcc acc gcg cac gcg gcg agc tgg ctg ggg ctg   336
Ser Met Thr Phe Ala Ala Thr Ala His Ala Ala Ser Trp Leu Gly Leu
            100   105   110

gaa ccg gtg ttc tgc gac gtg gac ccc gag acc ggc ctg ctc gac ccc   384
Glu Pro Val Phe Cys Asp Val Asp Pro Glu Thr Gly Leu Leu Asp Pro
            115   120   125

gag cac gtc gcg tcg ctg gtg aca ccg cgg acg ggc gcg atc atc ggc   432
Glu His Val Ala Ser Leu Val Thr Pro Arg Thr Gly Ala Ile Ile Gly
        130   135   140

gtg cac ctg tgg ggc agg ccc gct ccg gtc gag gcg ctg gag aag atc   480
Val His Leu Trp Gly Arg Pro Ala Pro Val Glu Ala Leu Glu Lys Ile
145   150   155   160

gcc gcc gag cac cag gtc aaa ctc ttc ttc gac gcc gcg cac gcg ctg   528
Ala Ala Glu His Gln Val Lys Leu Phe Phe Asp Ala Ala His Ala Leu
                165   170   175

ggc tgc acc gcc ggc ggg cgg ccg gtc ggc gcc ttc ggc aac gcc gag   576
Gly Cys Thr Ala Gly Gly Arg Pro Val Gly Ala Phe Gly Asn Ala Glu
            180   185   190

gtg ttc agc ttc cac gcc acg aag gcg gtc acc tcg ttc gag ggc ggc   624
Val Phe Ser Phe His Ala Thr Lys Ala Val Thr Ser Phe Glu Gly Gly
            195   200   205

gcc atc gtc acc gac gac ggg ctg ctg gcc gac cgc atc cgc gcc atg   672
Ala Ile Val Thr Asp Asp Gly Leu Leu Ala Asp Arg Ile Arg Ala Met
            210   215   220

cac aac ttc ggg atc gca ccg gac aag ctg gtg acc gat gtc ggc acc   720
His Asn Phe Gly Ile Ala Pro Asp Lys Leu Val Thr Asp Val Gly Thr

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```
aac ggc aag atg agc gag tgc gcc gcg gcg atg ggc ctc acc tcg ctc    768
Asn Gly Lys Met Ser Glu Cys Ala Ala Ala Met Gly Leu Thr Ser Leu
            245                 250                 255

gac gcc ttc gcc gag acc agg gtg cac aac cgc ctc aac cac gcg ctc    816
Asp Ala Phe Ala Glu Thr Arg Val His Asn Arg Leu Asn His Ala Leu
            260                 265                 270

tac tcc gac gag ctc cgc gac gtg cgc ggc ata tcc gtg cac gcg ttc    864
Tyr Ser Asp Glu Leu Arg Asp Val Arg Gly Ile Ser Val His Ala Phe
            275                 280                 285

gat cct ggc gag cag aac aac tac cag tac gtg atc atc tcg gtg gac    912
Asp Pro Gly Glu Gln Asn Asn Tyr Gln Tyr Val Ile Ile Ser Val Asp
    290                 295                 300

tcc gcg gcc acc ggc atc gac cgc gac cag ttg cag gcg atc ctg cga    960
Ser Ala Ala Thr Gly Ile Asp Arg Asp Gln Leu Gln Ala Ile Leu Arg
305                 310                 315                 320

gcg gag aag gtt gtg gca caa ccc tac ttc tcc ccc ggg tgc cac cag    1008
Ala Glu Lys Val Val Ala Gln Pro Tyr Phe Ser Pro Gly Cys His Gln
            325                 330                 335

atg cag ccg tac cgg acc gag ccg ccg ctg cgg ctg gag aac acc gaa    1056
Met Gln Pro Tyr Arg Thr Glu Pro Pro Leu Arg Leu Glu Asn Thr Glu
            340                 345                 350

cag ctc tcc gac cgg gtg ctc gcg ctg ccc acc ggc ccc gcg gtg tcc    1104
Gln Leu Ser Asp Arg Val Leu Ala Leu Pro Thr Gly Pro Ala Val Ser
            355                 360                 365

agc gag gac atc cgg cgg gtg tgc gac atc atc cgg ctc gcc gcc acc    1152
Ser Glu Asp Ile Arg Arg Val Cys Asp Ile Ile Arg Leu Ala Ala Thr
            370                 375                 380

agc ggc gag ctg atc aac gcg caa tgg gac cag agg acg cgc aac ggt    1200
Ser Gly Glu Leu Ile Asn Ala Gln Trp Asp Gln Arg Thr Arg Asn Gly
385                 390                 395                 400

tcg tga                                                            1206
Ser
```

```
<210> 14
<211> 401
<212> PRT
<213>

<400> 14
Met Lys Arg Ala Leu Thr Asp Leu Ala Ile Phe Gly Gly Pro Glu Ala
 1               5                  10                  15

Phe Leu His Thr Leu Tyr Val Gly Arg Pro Thr Val Gly Asp Arg Glu
                20                  25                  30

Arg Phe Phe Ala Arg Leu Glu Trp Ala Leu Asn Asn Asn Trp Leu Thr
            35                  40                  45
```

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```
Asn Gly Gly Pro Leu Val Arg Glu Phe Glu Gly Arg Val Ala Asp Leu
    50                  55                  60

Ala Gly Val Arg His Cys Val Ala Thr Cys Asn Ala Thr Val Ala Leu
65                  70                  75                      80

Gln Leu Val Leu Arg Ala Ser Asp Val Ser Gly Glu Val Val Met Pro
                85              90                  95

Ser Met Thr Phe Ala Ala Thr Ala His Ala Ala Ser Trp Leu Gly Leu
            100             105             110

Glu Pro Val Phe Cys Asp Val Asp Pro Glu Thr Gly Leu Leu Asp Pro
        115             120             125

Glu His Val Ala Ser Leu Val Thr Pro Arg Thr Gly Ala Ile Ile Gly
    130             135             140

Val His Leu Trp Gly Arg Pro Ala Pro Val Glu Ala Leu Glu Lys Ile
145             150             155                     160

Ala Ala Glu His Gln Val Lys Leu Phe Phe Asp Ala Ala His Ala Leu
            165             170             175

Gly Cys Thr Ala Gly Gly Arg Pro Val Gly Ala Phe Gly Asn Ala Glu
            180             185             190

Val Phe Ser Phe His Ala Thr Lys Ala Val Thr Ser Phe Glu Gly Gly
        195             200             205

Ala Ile Val Thr Asp Asp Gly Leu Leu Ala Asp Arg Ile Arg Ala Met
    210             215             220

His Asn Phe Gly Ile Ala Pro Asp Lys Leu Val Thr Asp Val Gly Thr
225             230             235                     240

Asn Gly Lys Met Ser Glu Cys Ala Ala Ala Met Gly Leu Thr Ser Leu
            245             250             255

Asp Ala Phe Ala Glu Thr Arg Val His Asn Arg Leu Asn His Ala Leu
        260             265             270

Tyr Ser Asp Glu Leu Arg Asp Val Arg Gly Ile Ser Val His Ala Phe
        275             280             285

Asp Pro Gly Glu Gln Asn Asn Tyr Gln Tyr Val Ile Ile Ser Val Asp
    290             295             300

Ser Ala Ala Thr Gly Ile Asp Arg Asp Gln Leu Gln Ala Ile Leu Arg
305             310                 315             320

Ala Glu Lys Val Val Ala Gln Pro Tyr Phe Ser Pro Gly Cys His Gln
            325             330             335

Met Gln Pro Tyr Arg Thr Glu Pro Pro Leu Arg Leu Glu Asn Thr Glu
            340             345             350

Gln Leu Ser Asp Arg Val Leu Ala Leu Pro Thr Gly Pro Ala Val Ser
            355             360             365

Ser Glu Asp Ile Arg Arg Val Cys Asp Ile Ile Arg Leu Ala Ala Thr
```

```
Ser Gly Glu Leu Ile Asn Ala Gln Trp Asp Gln Arg Thr Arg Asn Gly
385                390                395                400
```

```
Ser
```

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<210> 15
<211> 6093
<212> DNA
<213> Streptomyces antibioticus

<220>
<221> CDS
<222> (184)..(1386)
<223> /gene= "oleP1"

<220>
<221> CDS
<222> (1437)..(2714)
<223> /function= "glycosylation of 8,
      8a-desoxyoleandolide" /gene=  "oleG1"
      /transl_except= (pos: 1437...1439, aa: Met)

<220>
<221> CDS
<222> (2722)..(3999)
<223> /function= "glycosylation of 8,
      8a-desoxyoleandolide" /gene= "oleG2"

<220>
<221> CDS
<222> (4810)..(5967)
<223> /gene= "oleY"

<220>
<221> mat_peptide
<222> (184)

<400> 15
gcatgccccg ctttcctccc cctctccgaa cgcatcgacg acccgatccc cctcagggac 60

cggtgaagga gcgtgttgca ctcatgcagg acatgcaagg cgtacagccc gaaccagcca 120

gtgtcgaaca cgcggcggac gcagctcgaa cagagcgaac ggcgcacgga agccgcccag 180
```

```
gag atg gag gac agc gaa ctg ggg cgc cgc ctg cag atg ctc cgc ggc      228
    Met Glu Asp Ser Glu Leu Gly Arg Arg Leu Gln Met Leu Arg Gly
    1               5                   10                  15

atg cag tgg gtc ttc ggc gcc aac ggc gat ccg tac gcc cgg ctg ctg      276
Met Gln Trp Val Phe Gly Ala Asn Gly Asp Pro Tyr Ala Arg Leu Leu
                20                  25                  30

tgt ggc atg gag gat gac ccg tca cct ttc tac gac gcg ata cgg acc      324
Cys Gly Met Glu Asp Asp Pro Ser Pro Phe Tyr Asp Ala Ile Arg Thr
            35                  40                  45

ctg ggc gag ctg cac cgg agc agg acc gga gcc tgg gtc acc gcc gac      372
Leu Gly Glu Leu His Arg Ser Arg Thr Gly Ala Trp Val Thr Ala Asp
```

```
ccc ggg ctc ggg ggc cgc atc ctc gcc gac cgg aag gct cgg tgc ccg    420
Pro Gly Leu Gly Gly Arg Ile Leu Ala Asp Arg Lys Ala Arg Cys Pro
     65                  70                  75

gaa ggc tcg tgg ccg gtg cgg gcg aag acc gac ggg ctg gag cag tac    468
Glu Gly Ser Trp Pro Val Arg Ala Lys Thr Asp Gly Leu Glu Gln Tyr
 80                  85                  90                      95

gtg ctg ccc ggg cac cag gcg ttc ctg cgg ctg gag cgc gag gag gcc    516
Val Leu Pro Gly His Gln Ala Phe Leu Arg Leu Glu Arg Glu Glu Ala
                100                 105                 110

gag cga ctg cgg gag gtc gcg gcg ccg gtg ctg ggg gcc gcg gcg gtc    564
Glu Arg Leu Arg Glu Val Ala Ala Pro Val Leu Gly Ala Ala Ala Val
                115                 120                 125

gac gcg tgg cgc ccg ctg atc gac gag gtc tgc gcg ggg ctc gcg aag    612
Asp Ala Trp Arg Pro Leu Ile Asp Glu Val Cys Ala Gly Leu Ala Lys
            130                 135                 140

ggg ctg ccg gac acg ttc gac ctg gtc gag gag tac gcg ggg ctg gtg    660
Gly Leu Pro Asp Thr Phe Asp Leu Val Glu Glu Tyr Ala Gly Leu Val
            145                 150                 155

ccg gtc gag gtg ctg gcg cgg atc tgg ggc gtc ccg gag gag gac cgc    708
Pro Val Glu Val Leu Ala Arg Ile Trp Gly Val Pro Glu Glu Asp Arg
160                 165                 170                 175

gcc cgg ttc ggg cgt gac tgc cgg gcg ctc gct ccc gcg ctg gac agc    756
Ala Arg Phe Gly Arg Asp Cys Arg Ala Leu Ala Pro Ala Leu Asp Ser
                180                 185                 190

ctc ctg tgt ccc cag cag ttg gcg ctg agc aag gac atg gcg tcc gcc    804
Leu Leu Cys Pro Gln Gln Leu Ala Leu Ser Lys Asp Met Ala Ser Ala
                195                 200                 205

ctg gag gac ctg cgt ctc ctc ttc gac ggc ctc gac gcg acg ccg cgc    852
Leu Glu Asp Leu Arg Leu Leu Phe Asp Gly Leu Asp Ala Thr Pro Arg
            210                 215                 220

ctc gcc ggc ccc gcc gac ggt gac gga acg gcc gtg gcc atg ctc acc    900
Leu Ala Gly Pro Ala Asp Gly Asp Gly Thr Ala Val Ala Met Leu Thr
            225                 230                 235

gtt ctg ctc tgc acg gag ccg gtg acc acg gcg atc ggg aac acc gtg    948
Val Leu Leu Cys Thr Glu Pro Val Thr Thr Ala Ile Gly Asn Thr Val
240                 245                 250                 255

ctc ggg ctc ctt ccc ggg cag tgg ccc gtg ccc tgc acc ggc cgg gtg    996
Leu Gly Leu Leu Pro Gly Gln Trp Pro Val Pro Cys Thr Gly Arg Val
                260                 265                 270

gct gcc ggg cag gtt gcc ggg cag gcg ctg cac cgg gcg gtg tcg tac   1044
Ala Ala Gly Gln Val Ala Gly Gln Ala Leu His Arg Ala Val Ser Tyr
                275                 280                 285

cgt atc gcg acg cgg ttc gcc cgg gag gac ctg gag ttg gcg ggc tgc   1092
Arg Ile Ala Thr Arg Phe Ala Arg Glu Asp Leu Glu Leu Ala Gly Cys
            290                 295                 300
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gag gtc aag tcc ggt gac gag gtg gtg gtc ctg gcc gga gcg atc ggc    1140
Glu Val Lys Ser Gly Asp Glu Val Val Val Leu Ala Gly Ala Ile Gly
    305             310             315

cgg aac gga ccg tcc gca gcc gcc ccg cct gcc cca ccg ggc cca gcg    1188
Arg Asn Gly Pro Ser Ala Ala Ala Pro Pro Ala Pro Pro Gly Pro Ala
320             325             330             335

gcc ccg ccc gcc ccg tcg gtc ttc ggt gcc gcc gcc ttc gag aac gcg    1236
Ala Pro Pro Ala Pro Ser Val Phe Gly Ala Ala Ala Phe Glu Asn Ala
            340             345             350

ctg gcc gaa ccc ctc gtc cgg gct gtg acg gga gcg gcc ctc cag gcc    1284
Leu Ala Glu Pro Leu Val Arg Ala Val Thr Gly Ala Ala Leu Gln Ala
            355             360             365

ctc gcg gag ggg ccc ccc cgg ctg acg gcg gcg gga ccc gtc gta cga    1332
Leu Ala Glu Gly Pro Pro Arg Leu Thr Ala Ala Gly Pro Val Val Arg
        370             375             380

cgg cgg cgt tcc cct gtc gtc ggc ggg ctg cac cgg gct ccg gtg gcc    1380
Arg Arg Arg Ser Pro Val Val Gly Gly Leu His Arg Ala Pro Val Ala
    385             390             395

gcc gca tgagcatcgc gtcgaacggc gcgcgctcgg cccccgccg gccctgcgc       1436
Ala Ala
400

gtg atg atg acc acc ttc gcg gcc aac acg cac ttc cag ccg ctg gtt    1484
Met Met Met Thr Thr Phe Ala Ala Asn Thr His Phe Gln Pro Leu Val
            405             410             415

ccc ctg gcc tgg gca ctg cgg aca gcc ggg cac gag gtg cgc gtg gtg    1532
Pro Leu Ala Trp Ala Leu Arg Thr Ala Gly His Glu Val Arg Val Val
            420             425             430

agc cag ccc tcg ctg agc gac gtg gtg acg cag gcg ggg ctc acc tcg    1580
Ser Gln Pro Ser Leu Ser Asp Val Val Thr Gln Ala Gly Leu Thr Ser
    435             440             445

gtc ccg gtg ggc acc gag gct ccg gtc gag cag ttc gcg gcg acc tgg    1628
Val Pro Val Gly Thr Glu Ala Pro Val Glu Gln Phe Ala Ala Thr Trp
450             455             460             465

ggc gac gat gcc tac atc ggc gtc aac agc atc gac ttc acc ggc aac    1676
Gly Asp Asp Ala Tyr Ile Gly Val Asn Ser Ile Asp Phe Thr Gly Asn
            470             475             480

gac ccc ggc ctg tgg acg tgg ccg tac ctc ctg ggc atg gag acc atg    1724
Asp Pro Gly Leu Trp Thr Trp Pro Tyr Leu Leu Gly Met Glu Thr Met
            485             490             495

ctg gtg ccg gcc ttc tac gag ttg ctg aac aac gag tcc ttc gtg gac    1772
Leu Val Pro Ala Phe Tyr Glu Leu Leu Asn Asn Glu Ser Phe Val Asp
            500             505             510

ggc gta gtc gag ttc gcc cgt gac tgg cgg ccc gac ctg gtg atc tgg    1820
Gly Val Val Glu Phe Ala Arg Asp Trp Arg Pro Asp Leu Val Ile Trp
515             520             525
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gag ccg ctg acg ttc gcc ggc gcg gtg gcg gcg cgc gtc acc ggc gcg     1868
Glu Pro Leu Thr Phe Ala Gly Ala Val Ala Ala Arg Val Thr Gly Ala
530             535                 540                 545

gcc cac gcc cgg ctg ccg tgg ggg cag gag atc acc ctg cgc ggg cgg     1916
Ala His Ala Arg Leu Pro Trp Gly Gln Glu Ile Thr Leu Arg Gly Arg
                550                 555                 560

cag gcg ttc ctc gcc gag cgt gcc ctg caa ccg ttc gag cac cgg gag     1964
Gln Ala Phe Leu Ala Glu Arg Ala Leu Gln Pro Phe Glu His Arg Glu
                565                 570                 575

gat ccc acg gcc gag tgg ctg ggc cgc atg ctc gac cgg tac ggc tgc     2012
Asp Pro Thr Ala Glu Trp Leu Gly Arg Met Leu Asp Arg Tyr Gly Cys
            580             585                 590

tcg ttc gac gag gag atg gtc acc ggg cag tgg acc atc gac acg ctg     2060
Ser Phe Asp Glu Glu Met Val Thr Gly Gln Trp Thr Ile Asp Thr Leu
            595                 600                 605

ccg cgc agc atg cgg ctg gag ctg tcc gag gag ctg cgc acc ctg gac     2108
Pro Arg Ser Met Arg Leu Glu Leu Ser Glu Glu Leu Arg Thr Leu Asp
610                 615                 620                 625

atg cgg tac gtg ccg tac aac gga ccg gcg gtc gta ccc ccc tgg gtg     2156
Met Arg Tyr Val Pro Tyr Asn Gly Pro Ala Val Val Pro Pro Trp Val
                630                 635                 640

tgg gaa ccg tgc gag cgg ccc cgg gtc tgt ctg acg atc ggc acc tcc     2204
Trp Glu Pro Cys Glu Arg Pro Arg Val Cys Leu Thr Ile Gly Thr Ser
                645                 650                 655

cag cgt gac tcc ggc cgg gac cat gtc ccc ctc gac cac ctg ctc gac     2252
Gln Arg Asp Ser Gly Arg Asp His Val Pro Leu Asp His Leu Leu Asp
            660                 665                 670

tcc ctc gcc gac gtg gac gcg gag atc gtg gcc acg ctc gac acc acc     2300
Ser Leu Ala Asp Val Asp Ala Glu Ile Val Ala Thr Leu Asp Thr Thr
            675                 680                 685

cag cag gag cgc ctg cgg ggc gcg gcc ccc ggc aac gtc cgg ctg gtg     2348
Gln Gln Glu Arg Leu Arg Gly Ala Ala Pro Gly Asn Val Arg Leu Val
690                 695                 700                 705

gac ttc gtc ccg ctg cac gcg ctg atg ccg acc tgc tcg gcg atc gtg     2396
Asp Phe Val Pro Leu His Ala Leu Met Pro Thr Cys Ser Ala Ile Val
                710                 715                 720

cac cac ggt ggt ccg ggc acg tgg tcg acg gcg gcg ctc cac ggc gtc     2444
His His Gly Gly Pro Gly Thr Trp Ser Thr Ala Ala Leu His Gly Val
                725                 730                 735

ccg cag atc atc ctg gac acc tcg tgg gac aca ccg gtg cgg gcg cag     2492
Pro Gln Ile Ile Leu Asp Thr Ser Trp Asp Thr Pro Val Arg Ala Gln
                740                 745                 750

cgc atg cag caa ctc ggg gcg ggc ctg tcg atg ccg gtg ggg gaa ctg     2540
Arg Met Gln Gln Leu Gly Ala Gly Leu Ser Met Pro Val Gly Glu Leu
755                 760                 765

ggc gtc gag gcg ctg cgg gac cgg gtc ctg cgg ctg ctg ggg gag ccg     2588
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Gly Val Glu Ala Leu Arg Asp Arg Val Leu Arg Leu Leu Gly Glu Pro
770             775             780             785

gag ttc cgc gcg ggc gcc gag cgg atc cgg gcc gag atg ctc gcg atg    2636
Glu Phe Arg Ala Gly Ala Glu Arg Ile Arg Ala Glu Met Leu Ala Met
                790             795             800

ccc gcc ccc ggt gac gtc gta ccg gac ctg gaa cga ctc acc gcg gag    2684
Pro Ala Pro Gly Asp Val Val Pro Asp Leu Glu Arg Leu Thr Ala Glu
                805             810             815

cat gcc acc ggc gcg atg gcg gga agg cgg tgagacg atg cgc gta ctg    2733
His Ala Thr Gly Ala Met Ala Gly Arg Arg         Met Arg Val Leu
                820             825                 830

ctg acc tgc ttc gcc aac gac acc cac ttc cac ggg ctg gtg ccg ctg    2781
Leu Thr Cys Phe Ala Asn Asp Thr His Phe His Gly Leu Val Pro Leu
                835             840             845

gcg tgg gcg ctg cgg gcc gcc ggg cac gaa gtc cgc gtg gcc agt cag    2829
Ala Trp Ala Leu Arg Ala Ala Gly His Glu Val Arg Val Ala Ser Gln
                850             855             860

ccc gcc ctg tcc gac acg atc acc caa gcg gga ctg acc gcg gtg ccc    2877
Pro Ala Leu Ser Asp Thr Ile Thr Gln Ala Gly Leu Thr Ala Val Pro
        865             870             875

gtg ggc cgg gac acc gcc ttc ctg gag ctg atg ggg gag atc ggc gcg    2925
Val Gly Arg Asp Thr Ala Phe Leu Glu Leu Met Gly Glu Ile Gly Ala
880             885             890             895

gac gtc cag aag tac tcc acc ggc atc gac ctg ggc gtc cgc gcg gag    2973
Asp Val Gln Lys Tyr Ser Thr Gly Ile Asp Leu Gly Val Arg Ala Glu
                900             905             910

ctg acg agc tgg gag tac ctg ctc ggc atg cac acg acc ctg gtg ccc    3021
Leu Thr Ser Trp Glu Tyr Leu Leu Gly Met His Thr Thr Leu Val Pro
                915             920             925

acg ttc tac tcg ctg gtc aac gac gag ccg ttc gtc gac ggg ctc gtc    3069
Thr Phe Tyr Ser Leu Val Asn Asp Glu Pro Phe Val Asp Gly Leu Val
                930             935             940

gcg ctg acc cgg gcc tgg cgg ccc gac ctc atc ctg tgg gag cac ttc    3117
Ala Leu Thr Arg Ala Trp Arg Pro Asp Leu Ile Leu Trp Glu His Phe
        945             950             955

agc ttc gcc ggg gcg ttg gcg gcg cgg gcc acc ggc acg ccc cac gcc    3165
Ser Phe Ala Gly Ala Leu Ala Ala Arg Ala Thr Gly Thr Pro His Ala
960             965             970             975

cgc gtg ctg tgg ggg tcg gac ctc atc gtc cgg ttc cgc cgg gac ttc    3213
Arg Val Leu Trp Gly Ser Asp Leu Ile Val Arg Phe Arg Arg Asp Phe
                980             985             990

ctc gcg gag cgg gcg aac cgg ccc gcc gag cac cgc gag gac ccc atg    3261
Leu Ala Glu Arg Ala Asn Arg Pro Ala Glu His Arg Glu Asp Pro Met
                995             1000            1005

gcg gag tgg ctg ggc tgg gcg gcc gaa cgg ctg ggc tcc acc ttc gac    3309
Ala Glu Trp Leu Gly Trp Ala Ala Glu Arg Leu Gly Ser Thr Phe Asp
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gag gag ctg gtg acc ggg cag tgg acg atc gac ccg ctg ccg cgg agc      3357
Glu Glu Leu Val Thr Gly Gln Trp Thr Ile Asp Pro Leu Pro Arg Ser
    1025                    1030                    1035

atg cgg ctg ccc acc ggg acg acg acg gtg ccg atg cgg tac gtg ccg      3405
Met Arg Leu Pro Thr Gly Thr Thr Thr Val Pro Met Arg Tyr Val Pro
1040                    1045                    1050

tac aac ggg cgg gcc gtg gtc ccc gca tgg gtc cgg cag cgt gcg cgg      3453
Tyr Asn Gly Arg Ala Val Val Pro Ala Trp Val Arg Gln Arg Ala Arg
                    1060                    1065                    1070

cgg ccc cgg atc tgc ctg acg ctc ggt gtg tcg gcc cgg cag acc ctg      3501
Arg Pro Arg Ile Cys Leu Thr Leu Gly Val Ser Ala Arg Gln Thr Leu
            1075                    1080                    1085

ggc gac ggc gtg tcg ctg gcg gag gtg ctg gcc gcg ctg ggc gac gtg      3549
Gly Asp Gly Val Ser Leu Ala Glu Val Leu Ala Ala Leu Gly Asp Val
        1090                    1095                    1100

gac gcg gag atc gtg gcc acg ctg gac gcc tcc cag cgc aag ctc ctg      3597
Asp Ala Glu Ile Val Ala Thr Leu Asp Ala Ser Gln Arg Lys Leu Leu
    1105                    1110                    1115

ggg ccg gtg ccg gac aac gtc cgg ctg gtg gac ttc gtg ccc ctg cac      3645
Gly Pro Val Pro Asp Asn Val Arg Leu Val Asp Phe Val Pro Leu His
1120                    1125                    1130                    1135

gcc ctg atg ccg acc tgt tcg gcg atc gtg cac cac ggc ggc gcc ggt      3693
Ala Leu Met Pro Thr Cys Ser Ala Ile Val His His Gly Gly Ala Gly
                    1140                    1145                    1150

acc tgg ctg acg gcc gcc gtc cac ggc gtc ccg cag atc gtc ctc ggt      3741
Thr Trp Leu Thr Ala Ala Val His Gly Val Pro Gln Ile Val Leu Gly
            1155                    1160                    1165

gac ctc tgg gac aac ctg ctg cgc gcc cgg cag aca cag gcc gcg ggc      3789
Asp Leu Trp Asp Asn Leu Leu Arg Ala Arg Gln Thr Gln Ala Ala Gly
        1170                    1175                    1180

gcg ggc ctg ttc atc cat ccg tcc gag gtc acc gcg gcc ggg ctc ggt      3837
Ala Gly Leu Phe Ile His Pro Ser Glu Val Thr Ala Ala Gly Leu Gly
    1185                    1190                    1195

gag ggc gtg cgc cgg gtg ctg acg gac cct tcc atc cgg gcc gcc gca      3885
Glu Gly Val Arg Arg Val Leu Thr Asp Pro Ser Ile Arg Ala Ala Ala
1200                    1205                    1210                    1215

cag cgc gtc cgg gac gag atg aat gca gag ccg acg ccg ggc gag gtc      3933
Gln Arg Val Arg Asp Glu Met Asn Ala Glu Pro Thr Pro Gly Glu Val
                    1220                    1225                    1230

gtc acg gtg ctg gag cgg ctc gcc gcg agc ggc gga cgc gga cga gga      3981
Val Thr Val Leu Glu Arg Leu Ala Ala Ser Gly Gly Arg Gly Arg Gly
            1235                    1240                    1245

ggc ggg aac cat gcg ggc tgacacggag ccgaccaccg ggtacgagga           4029
Gly Gly Asn His Ala Gly
        1250
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cgagttcgcc gagatctacg acgccgtgta ccgggggccgg ggcaaggact acgccggcga 4089

ggcgaaggac gtggcggacc tcgtgcgcga ccgggtgccg gacgcgtcct ccctcctgga 4149

cgtggcctgc ggcacgggcg cgcacctgcg gcacttcgcc acgctcttcg acgacgcccg 4209

cggtctcgaa ctgtccgcga gcatgctgga catcgcccgc tcccgcatgc cgggcgtgcc 4269

gctgcaccaa ggggacatgc gatccttcga cctggggcca cgcgtctccg cggtcacctg 4329

catgttcagc tccgtcggcc acctggccac caccgccgaa ctcgacgcga cgctgcggtg 4389

cttcgcccgg cacacccggc ccggcggcgt ggccgtcatc gaaccgtggt ggttcccgga 4449

gaccttcacc gacggctacg tggcgggtga catcgtacgc gtcgacggcc ggaccatctc 4509

ccgggtgtcc cactcggtac gggacggcgg cgccacccgc atggagatcc actacgtgat 4569

cgccgacgcc gagcacggtc cccggcacct ggtcgagcac caccgcatca cgctgttccc 4629

gcggcatgcg tacacggccg cgtacgagaa ggcgggctac accgtcgagt acctcgacgg 4689

cgggccctcg ggccgggggc tgttcgtcgg cacccggacg tgaacccgcc cgcgcaccgc 4749

ccgatcaccc tgctcaacgc cgttcacacg gatcaccgga ccacgcgaag gacctttcac 4809

atg tcg tac gac gac cac gcg gtg ctg gaa gcg ata ctg cgg tgc gcc   4857
Met Ser Tyr Asp Asp His Ala Val Leu Glu Ala Ile Leu Arg Cys Ala
    1255   1260   1265

gga ggt gac gag cgc ttc ctg ctg aac acc gtc gag gaa tgg gga gcc   4905
Gly Gly Asp Glu Arg Phe Leu Leu Asn Thr Val Glu Glu Trp Gly Ala
1270   1275   1280   1285

gcc gag atc acc gcg gcg ctc gtg gac gag ttg ctg ttc cgc tgc gag   4953
Ala Glu Ile Thr Ala Ala Leu Val Asp Glu Leu Leu Phe Arg Cys Glu
              1290   1295   1300

atc ccg cag gtg ggc ggt gag gcg ttc atc ggc ctg gac gtc ctg cac   5001
Ile Pro Gln Val Gly Gly Glu Ala Phe Ile Gly Leu Asp Val Leu His
              1305   1310   1315

ggc gcc gac cgg atc agc cat gtg ctg cag gtg acg gac ggc aag ccg   5049
Gly Ala Asp Arg Ile Ser His Val Leu Gln Val Thr Asp Gly Lys Pro
         1320   1325   1330

gtc acg tcg gcg gaa ccg gcc ggc cag gaa ctg ggc ggc cgt acc tgg   5097
Val Thr Ser Ala Glu Pro Ala Gly Gln Glu Leu Gly Gly Arg Thr Trp
    1335   1340   1345

agt tca cgc tca gcg acc ctc ctg cgg gag ctg ttc ggc ccg ccg tcc   5145
Ser Ser Arg Ser Ala Thr Leu Leu Arg Glu Leu Phe Gly Pro Pro Ser
1350   1355   1360   1365

ggc cgc acc gcg ggg ggc ttc ggc gtc tcc ttc ctg ccc gac ctg cgc   5193
Gly Arg Thr Ala Gly Gly Phe Gly Val Ser Phe Leu Pro Asp Leu Arg
         1370   1375   1380

ggc ccg cgg acc atg gag ggc gcg gcc ctg gcc gcc cgc gcc acc aac   5241
Gly Pro Arg Thr Met Glu Gly Ala Ala Leu Ala Ala Arg Ala Thr Asn

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gtg gtg ctg cac gcg acg acc aac gag acg ccc cca ctg gac cgg ctg    5289
Val Val Leu His Ala Thr Thr Asn Glu Thr Pro Pro Leu Asp Arg Leu
        1400                1405                1410

gcc ctg cgc tac gag tcc gac aag tgg ggc ggc gtc cac tgg ttc acc    5337
Ala Leu Arg Tyr Glu Ser Asp Lys Trp Gly Gly Val His Trp Phe Thr
    1415                1420                1425

ggc cac tac gac cgg cac ctg cgg gcc gtg cgc gac cag gcg gtg cgg    5385
Gly His Tyr Asp Arg His Leu Arg Ala Val Arg Asp Gln Ala Val Arg
1430                1435                1440                1445

atc ctg gag atc ggc atc ggc ggc tac gac gac ctg ctg ccg agc ggc    5433
Ile Leu Glu Ile Gly Ile Gly Gly Tyr Asp Asp Leu Leu Pro Ser Gly
                1450                1455                1460

gcc tca ctg aag atg tgg aag cgc tac ttc ccg cgc ggc ctg gtc ttc    5481
Ala Ser Leu Lys Met Trp Lys Arg Tyr Phe Pro Arg Gly Leu Val Phe
        1465                1470                1475

ggc gtg gac atc ttc gac agt cgg cgt gcg acc agc cgc gtg tca aga    5529
Gly Val Asp Ile Phe Asp Ser Arg Arg Ala Thr Ser Arg Val Ser Arg
        1480                1485                1490

cgc tcc gcg gcc cgg cag gac gac ccg gag ttc atg cgc cgc gtc gcc    5577
Arg Ser Ala Ala Arg Gln Asp Asp Pro Glu Phe Met Arg Arg Val Ala
    1495                1500                1505

gag gag cac ggg ccg ttc gac gtc atc atc gac gac ggc agc cac atc    5625
Glu Glu His Gly Pro Phe Asp Val Ile Ile Asp Asp Gly Ser His Ile
1510                1515                1520                1525

aac gca cac atg cgg acg tcg ttc tcg gtg atg ttc ccc cac ctg cgc    5673
Asn Ala His Met Arg Thr Ser Phe Ser Val Met Phe Pro His Leu Arg
                1530                1535                1540

aac ggc ggc ttc tac gtc atc gag gac acc ttc acc tcc tac tgg ccc    5721
Asn Gly Gly Phe Tyr Val Ile Glu Asp Thr Phe Thr Ser Tyr Trp Pro
        1545                1550                1555

ggg tac gga ggg cca tcc gga gcc cgg tgc ccg tcc gga aca acc gcg    5769
Gly Tyr Gly Gly Pro Ser Gly Ala Arg Cys Pro Ser Gly Thr Thr Ala
        1560                1565                1570

ctg gag atg gtc aag gga ctg atc gac tcg gtg cac tac gag gag cgg    5817
Leu Glu Met Val Lys Gly Leu Ile Asp Ser Val His Tyr Glu Glu Arg
    1575                1580                1585

ccg gac ggc gcg gcc acg gcc gac tac atc gcc agg aac ctc gtc ggg    5865
Pro Asp Gly Ala Ala Thr Ala Asp Tyr Ile Ala Arg Asn Leu Val Gly
1590                1595                1600                1605

ctg cac gcc tac caa acg acc tcg tct tcc tcg aga agg gcg atc aac    5913
Leu His Ala Tyr Gln Thr Thr Ser Ser Ser Arg Arg Ala Ile Asn
                1610                1615                1620

aag gag ggc ggc atc ccc cac acc gtg ccc cgg gag ccg ttc tgg aac    5961
Lys Glu Gly Gly Ile Pro His Thr Val Pro Arg Glu Pro Phe Trp Asn
        1625                1630                1635
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gac aac tagccacggc cgcaaccaga gccggaaacc gcaccactgt ccgcgccacc     6017
Asp Asn

tcggaaccac ctccagcaaa ggacacaccg ctgtgaccga tacgcacacc ggaccgacac 6077

cggccgacgc ggtacc                                                  6093


<210> 16
<211> 401
<212> PRT
<213>

<400> 16
Met Glu Asp Ser Glu Leu Gly Arg Arg Leu Gln Met Leu Arg Gly Met
 1               5                  10                  15

Gln Trp Val Phe Gly Ala Asn Gly Asp Pro Tyr Ala Arg Leu Leu Cys
            20                  25                  30

Gly Met Glu Asp Asp Pro Ser Pro Phe Tyr Asp Ala Ile Arg Thr Leu
        35                  40                  45

Gly Glu Leu His Arg Ser Arg Thr Gly Ala Trp Val Thr Ala Asp Pro
    50                  55                  60

Gly Leu Gly Gly Arg Ile Leu Ala Asp Arg Lys Ala Arg Cys Pro Glu
65                  70                  75                  80

Gly Ser Trp Pro Val Arg Ala Lys Thr Asp Gly Leu Glu Gln Tyr Val
            85                  90                  95

Leu Pro Gly His Gln Ala Phe Leu Arg Leu Glu Arg Glu Glu Ala Glu
            100                 105                 110

Arg Leu Arg Glu Val Ala Ala Pro Val Leu Gly Ala Ala Ala Val Asp
        115                 120                 125

Ala Trp Arg Pro Leu Ile Asp Glu Val Cys Ala Gly Leu Ala Lys Gly
    130                 135                 140

Leu Pro Asp Thr Phe Asp Leu Val Glu Glu Tyr Ala Gly Leu Val Pro
145                 150                 155                 160

Val Glu Val Leu Ala Arg Ile Trp Gly Val Pro Glu Glu Asp Arg Ala
            165                 170                 175

Arg Phe Gly Arg Asp Cys Arg Ala Leu Ala Pro Ala Leu Asp Ser Leu
            180                 185                 190

Leu Cys Pro Gln Gln Leu Ala Leu Ser Lys Asp Met Ala Ser Ala Leu
            195                 200                 205

Glu Asp Leu Arg Leu Leu Phe Asp Gly Leu Asp Ala Thr Pro Arg Leu
    210                 215                 220

Ala Gly Pro Ala Asp Gly Asp Gly Thr Ala Val Ala Met Leu Thr Val
225                 230                 235                 240

Leu Leu Cys Thr Glu Pro Val Thr Thr Ala Ile Gly Asn Thr Val Leu
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```
Gly Leu Leu Pro Gly Gln Trp Pro Val Pro Cys Thr Gly Arg Val Ala
        260             265             270

Ala Gly Gln Val Ala Gly Gln Ala Leu His Arg Ala Val Ser Tyr Arg
        275             280             285

Ile Ala Thr Arg Phe Ala Arg Glu Asp Leu Glu Leu Ala Gly Cys Glu
    290             295             300

Val Lys Ser Gly Asp Glu Val Val Val Leu Ala Gly Ala Ile Gly Arg
305             310             315             320

Asn Gly Pro Ser Ala Ala Ala Pro Pro Ala Pro Pro Gly Pro Ala Ala
            325             330             335

Pro Pro Ala Pro Ser Val Phe Gly Ala Ala Ala Phe Glu Asn Ala Leu
        340             345             350

Ala Glu Pro Leu Val Arg Ala Val Thr Gly Ala Ala Leu Gln Ala Leu
        355             360             365

Ala Glu Gly Pro Pro Arg Leu Thr Ala Ala Gly Pro Val Val Arg Arg
    370             375             380

Arg Arg Ser Pro Val Val Gly Gly Leu His Arg Ala Pro Val Ala Ala
385             390             395             400

Ala
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<210> 17
<211> 426
<212> PRT
<213>

<400> 17
Met Met Met Thr Thr Phe Ala Ala Asn Thr His Phe Gln Pro Leu Val
  1           5               10              15

Pro Leu Ala Trp Ala Leu Arg Thr Ala Gly His Glu Val Arg Val Val
            20              25              30

Ser Gln Pro Ser Leu Ser Asp Val Val Thr Gln Ala Gly Leu Thr Ser
        35              40              45

Val Pro Val Gly Thr Glu Ala Pro Val Glu Gln Phe Ala Ala Thr Trp
    50              55              60

Gly Asp Asp Ala Tyr Ile Gly Val Asn Ser Ile Asp Phe Thr Gly Asn
65              70              75              80

Asp Pro Gly Leu Trp Thr Trp Pro Tyr Leu Leu Gly Met Glu Thr Met
            85              90              95

Leu Val Pro Ala Phe Tyr Glu Leu Leu Asn Asn Glu Ser Phe Val Asp
        100             105             110

Gly Val Val Glu Phe Ala Arg Asp Trp Arg Pro Asp Leu Val Ile Trp
        115             120             125
```

Glu Pro Leu Thr Phe Ala Gly Ala Val Ala Ala Arg Val Thr Gly Ala
    130   135   140

Ala His Ala Arg Leu Pro Trp Gly Gln Glu Ile Thr Leu Arg Gly Arg
145   150   155   160

Gln Ala Phe Leu Ala Glu Arg Ala Leu Gln Pro Phe Glu His Arg Glu
                165   170   175

Asp Pro Thr Ala Glu Trp Leu Gly Arg Met Leu Asp Arg Tyr Gly Cys
            180   185   190

Ser Phe Asp Glu Glu Met Val Thr Gly Gln Trp Thr Ile Asp Thr Leu
        195   200   205

Pro Arg Ser Met Arg Leu Glu Leu Ser Glu Glu Leu Arg Thr Leu Asp
    210   215   220

Met Arg Tyr Val Pro Tyr Asn Gly Pro Ala Val Val Pro Pro Trp Val
225   230   235   240

Trp Glu Pro Cys Glu Arg Pro Arg Val Cys Leu Thr Ile Gly Thr Ser
            245   250   255

Gln Arg Asp Ser Gly Arg Asp His Val Pro Leu Asp His Leu Leu Asp
            260   265   270

Ser Leu Ala Asp Val Asp Ala Glu Ile Val Ala Thr Leu Asp Thr Thr
        275   280   285

Gln Gln Glu Arg Leu Arg Gly Ala Ala Pro Gly Asn Val Arg Leu Val
    290   295   300

Asp Phe Val Pro Leu His Ala Leu Met Pro Thr Cys Ser Ala Ile Val
305   310   315   320

His His Gly Gly Pro Gly Thr Trp Ser Thr Ala Ala Leu His Gly Val
            325   330   335

Pro Gln Ile Ile Leu Asp Thr Ser Trp Asp Thr Pro Val Arg Ala Gln
            340   345   350

Arg Met Gln Gln Leu Gly Ala Gly Leu Ser Met Pro Val Gly Glu Leu
        355   360   365

Gly Val Glu Ala Leu Arg Asp Arg Val Leu Arg Leu Leu Gly Glu Pro
    370   375   380

Glu Phe Arg Ala Gly Ala Glu Arg Ile Arg Ala Glu Met Leu Ala Met
385   390   395   400

Pro Ala Pro Gly Asp Val Val Pro Asp Leu Glu Arg Leu Thr Ala Glu
            405   410   415

His Ala Thr Gly Ala Met Ala Gly Arg Arg
            420   425

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<212> PRT
<213>

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Leu Val Pro Leu Ala Trp Ala Leu Arg Ala Ala Gly His Glu Val Arg
            20   25   30

Val Ala Ser Gln Pro Ala Leu Ser Asp Thr Ile Thr Gln Ala Gly Leu
            35   40   45

Thr Ala Val Pro Val Gly Arg Asp Thr Ala Phe Leu Glu Leu Met Gly
    50   55   60

Glu Ile Gly Ala Asp Val Gln Lys Tyr Ser Thr Gly Ile Asp Leu Gly
65   70   75   80

Val Arg Ala Glu Leu Thr Ser Trp Glu Tyr Leu Leu Gly Met His Thr
            85   90   95

Thr Leu Val Pro Thr Phe Tyr Ser Leu Val Asn Asp Glu Pro Phe Val
            100   105   110

Asp Gly Leu Val Ala Leu Thr Arg Ala Trp Arg Pro Asp Leu Ile Leu
            115   120   125

Trp Glu His Phe Ser Phe Ala Gly Ala Leu Ala Ala Arg Ala Thr Gly
    130   135   140

Thr Pro His Ala Arg Val Leu Trp Gly Ser Asp Leu Ile Val Arg Phe
145   150   155   160

Arg Arg Asp Phe Leu Ala Glu Arg Ala Asn Arg Pro Ala Glu His Arg
            165   170   175

Glu Asp Pro Met Ala Glu Trp Leu Gly Trp Ala Ala Glu Arg Leu Gly
            180   185   190

Ser Thr Phe Asp Glu Glu Leu Val Thr Gly Gln Trp Thr Ile Asp Pro
            195   200   205

Leu Pro Arg Ser Met Arg Leu Pro Thr Gly Thr Thr Thr Val Pro Met
    210   215   220

Arg Tyr Val Pro Tyr Asn Gly Arg Ala Val Val Pro Ala Trp Val Arg
225   230   235   240

Gln Arg Ala Arg Arg Pro Arg Ile Cys Leu Thr Leu Gly Val Ser Ala
            245   250   255

Arg Gln Thr Leu Gly Asp Gly Val Ser Leu Ala Glu Val Leu Ala Ala
            260   265   270

Leu Gly Asp Val Asp Ala Glu Ile Val Ala Thr Leu Asp Ala Ser Gln
            275   280   285

Arg Lys Leu Leu Gly Pro Val Pro Asp Asn Val Arg Leu Val Asp Phe
            290   295   300

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Val Pro Leu His Ala Leu Met Pro Thr Cys Ser Ala Ile Val His His
305             310             315             320

Gly Gly Ala Gly Thr Trp Leu Thr Ala Ala Val His Gly Val Pro Gln
                325             330             335

Ile Val Leu Gly Asp Leu Trp Asp Asn Leu Leu Arg Ala Arg Gln Thr
                340             345             350

Gln Ala Ala Gly Ala Gly Leu Phe Ile His Pro Ser Glu Val Thr Ala
        355             360             365

Ala Gly Leu Gly Glu Gly Val Arg Arg Val Leu Thr Asp Pro Ser Ile
        370             375             380

Arg Ala Ala Ala Gln Arg Val Arg Asp Glu Met Asn Ala Glu Pro Thr
385             390             395             400

Pro Gly Glu Val Val Thr Val Leu Glu Arg Leu Ala Ala Ser Gly Gly
                405             410             415

Arg Gly Arg Gly Gly Gly Asn His Ala Gly
            420             425


<210> 19
<211> 386
<212> PRT
<213>

<400> 19
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Gly Gly Asp Glu Arg Phe Leu Leu Asn Thr Val Glu Glu Trp Gly Ala
                20              25              30

Ala Glu Ile Thr Ala Ala Leu Val Asp Glu Leu Leu Phe Arg Cys Glu
            35              40              45

Ile Pro Gln Val Gly Gly Glu Ala Phe Ile Gly Leu Asp Val Leu His
        50              55              60

Gly Ala Asp Arg Ile Ser His Val Leu Gln Val Thr Asp Gly Lys Pro
65              70              75              80

Val Thr Ser Ala Glu Pro Ala Gly Gln Glu Leu Gly Gly Arg Thr Trp
                85              90              95

Ser Ser Arg Ser Ala Thr Leu Leu Arg Glu Leu Phe Gly Pro Pro Ser
            100             105             110

Gly Arg Thr Ala Gly Gly Phe Gly Val Ser Phe Leu Pro Asp Leu Arg
        115             120             125

Gly Pro Arg Thr Met Glu Gly Ala Ala Leu Ala Ala Arg Ala Thr Asn
        130             135             140

Val Val Leu His Ala Thr Thr Asn Glu Thr Pro Pro Leu Asp Arg Leu
145             150             155             160
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Ala Leu Arg Tyr Glu Ser Asp Lys Trp Gly Gly Val His Trp Phe Thr
                165   170   175

Gly His Tyr Asp Arg His Leu Arg Ala Val Arg Asp Gln Ala Val Arg
            180   185   190

Ile Leu Glu Ile Gly Ile Gly Gly Tyr Asp Asp Leu Leu Pro Ser Gly
        195   200   205

Ala Ser Leu Lys Met Trp Lys Arg Tyr Phe Pro Arg Gly Leu Val Phe
    210   215   220

Gly Val Asp Ile Phe Asp Ser Arg Arg Ala Thr Ser Arg Val Ser Arg
225   230   235   240

Arg Ser Ala Ala Arg Gln Asp Asp Pro Glu Phe Met Arg Arg Val Ala
            245   250   255

Glu Glu His Gly Pro Phe Asp Val Ile Ile Asp Asp Gly Ser His Ile
            260   265   270

Asn Ala His Met Arg Thr Ser Phe Ser Val Met Phe Pro His Leu Arg
        275   280   285

Asn Gly Gly Phe Tyr Val Ile Glu Asp Thr Phe Thr Ser Tyr Trp Pro
    290   295   300

Gly Tyr Gly Gly Pro Ser Gly Ala Arg Cys Pro Ser Gly Thr Thr Ala
305   310   315   320

Leu Glu Met Val Lys Gly Leu Ile Asp Ser Val His Tyr Glu Glu Arg
            325   330   335

Pro Asp Gly Ala Ala Thr Ala Asp Tyr Ile Ala Arg Asn Leu Val Gly
            340   345   350

Leu His Ala Tyr Gln Thr Thr Ser Ser Ser Ser Arg Arg Ala Ile Asn
        355   360   365

Lys Glu Gly Gly Ile Pro His Thr Val Pro Arg Glu Pro Phe Trp Asn
    370   375   380

Asp Asn
385

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<212> DNA
<213> Streptomyces antibioticus

<220>
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<222> (1)..(738)
<223> /gene= "oleM" /note= "SEQ ID No. 15 from 3992 to
      4729"

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gag atc tac gac gcc gtg tac cgg ggc cgg ggc aag gac tac gcc ggc   96
Glu Ile Tyr Asp Ala Val Tyr Arg Gly Arg Gly Lys Asp Tyr Ala Gly
                 20                  25                  30

gag gcg aag gac gtg gcg gac ctc gtg cgc gac cgg gtg ccg gac gcg  144
Glu Ala Lys Asp Val Ala Asp Leu Val Arg Asp Arg Val Pro Asp Ala
             35                  40                  45

tcc tcc ctc ctg gac gtg gcc tgc ggc acg ggc gcg cac ctg cgg cac  192
Ser Ser Leu Leu Asp Val Ala Cys Gly Thr Gly Ala His Leu Arg His
         50                  55                  60

ttc gcc acg ctc ttc gac gac gcc cgc ggt ctc gaa ctg tcc gcg agc  240
Phe Ala Thr Leu Phe Asp Asp Ala Arg Gly Leu Glu Leu Ser Ala Ser
 65                  70                  75                  80

atg ctg gac atc gcc cgc tcc cgc atg ccg ggc gtg ccg ctg cac caa  288
Met Leu Asp Ile Ala Arg Ser Arg Met Pro Gly Val Pro Leu His Gln
                 85                  90                  95

ggg gac atg cga tcc ttc gac ctg ggg cca cgc gtc tcc gcg gtc acc  336
Gly Asp Met Arg Ser Phe Asp Leu Gly Pro Arg Val Ser Ala Val Thr
                100                 105                 110

tgc atg ttc agc tcc gtc ggc cac ctg gcc acc acc gcc gaa ctc gac  384
Cys Met Phe Ser Ser Val Gly His Leu Ala Thr Thr Ala Glu Leu Asp
            115                 120                 125

gcg acg ctg cgg tgc ttc gcc cgg cac acc cgg ccc ggc ggc gtg gcc  432
Ala Thr Leu Arg Cys Phe Ala Arg His Thr Arg Pro Gly Gly Val Ala
        130                 135                 140

gtc atc gaa ccg tgg tgg ttc ccg gag acc ttc acc gac ggc tac gtg  480
Val Ile Glu Pro Trp Trp Phe Pro Glu Thr Phe Thr Asp Gly Tyr Val
145                 150                 155                 160

gcg ggt gac atc gta cgc gtc gac ggc cgg acc atc tcc cgg gtg tcc  528
Ala Gly Asp Ile Val Arg Val Asp Gly Arg Thr Ile Ser Arg Val Ser
                165                 170                 175

cac tcg gta cgg gac ggc ggc gcc acc cgc atg gag atc cac tac gtg  576
His Ser Val Arg Asp Gly Gly Ala Thr Arg Met Glu Ile His Tyr Val
            180                 185                 190

atc gcc gac gcc gag cac ggt ccc cgg cac ctg gtc gag cac cac cgc  624
Ile Ala Asp Ala Glu His Gly Pro Arg His Leu Val Glu His His Arg
            195                 200                 205

atc acg ctg ttc ccg cgg cat gcg tac acg gcc gcg tac gag aag gcg  672
Ile Thr Leu Phe Pro Arg His Ala Tyr Thr Ala Ala Tyr Glu Lys Ala
        210                 215                 220

ggc tac acc gtc gag tac ctc gac ggc ggg ccc tcg ggc cgg ggg ctg  720
Gly Tyr Thr Val Glu Tyr Leu Asp Gly Gly Pro Ser Gly Arg Gly Leu
225                 230                 235                 240
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44

ttc gtc ggc acc cgg acg   738
Phe Val Gly Thr Arg Thr
                245

<210> 21
<211> 246
<212> PRT
<213>

<400> 21
Met Arg Ala Asp Thr Glu Pro Thr Thr Gly Tyr Glu Asp Glu Phe Ala
  1   5   10   15

Glu Ile Tyr Asp Ala Val Tyr Arg Gly Arg Gly Lys Asp Tyr Ala Gly
                20   25   30

Glu Ala Lys Asp Val Ala Asp Leu Val Arg Asp Arg Val Pro Asp Ala
            35   40   45

Ser Ser Leu Leu Asp Val Ala Cys Gly Thr Gly Ala His Leu Arg His
        50   55   60

Phe Ala Thr Leu Phe Asp Asp Ala Arg Gly Leu Glu Leu Ser Ala Ser
 65   70   75   80

Met Leu Asp Ile Ala Arg Ser Arg Met Pro Gly Val Pro Leu His Gln
                85   90   95

Gly Asp Met Arg Ser Phe Asp Leu Gly Pro Arg Val Ser Ala Val Thr
               100   105   110

Cys Met Phe Ser Ser Val Gly His Leu Ala Thr Thr Ala Glu Leu Asp
            115   120   125

Ala Thr Leu Arg Cys Phe Ala Arg His Thr Arg Pro Gly Gly Val Ala
        130   135   140
Ile Glu Pro Trp Trp Phe Pro Glu Thr Phe Thr Asp Gly Tyr Val
145   150   155   160

Ala Gly Asp Ile Val Arg Val Asp Gly Arg Thr Ile Ser Arg Val Ser
                165   170   175

His Ser Val Arg Asp Gly Gly Ala Thr Arg Met Glu Ile His Tyr Val
            180   185   190

Ile Ala Asp Ala Glu His Gly Pro Arg His Leu Val Glu His His Arg
            195   200   205

Ile Thr Leu Phe Pro Arg His Ala Tyr Thr Ala Ala Tyr Glu Lys Ala
        210   215   220

Gly Tyr Thr Val Glu Tyr Leu Asp Gly Gly Pro Ser Gly Arg Gly Leu
225   230   235   240

Phe Val Gly Thr Arg Thr
                245

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<210> 23
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gagaccatgc ccagggagt                                                    19


<210> 24
<211> 19
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tctgggagcc gctcacctt                                                    19


<210> 25
<211> 19
<212> DNA
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<400> 25
gacgaggccg aagaggtgg                                                    19


<210> 26
<211> 19
<212> DNA
<213> Streptomyces antibioticus

<220>
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<400> 26
gcacaccgga atggatgcg                                                    19


<210> 27
<211> 19
<212> DNA
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46

<213>

<220>
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<400> 27
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<210> 28
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<212> DNA
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<400> 28
gcccgagccg cacgtgcgt   19

<210> 29
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<220>
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tgcacgcgct gctgccgacc   20

<210> 30
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<400> 30
ttggcgaagt cgaccaggtc   20

<210> 31
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<400> 31
gccgctcggc acggtgaact tca   23

<210> 32
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47

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<220>
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atgcgcgtcg tcttctcctc catg                                          24


<210> 33
<211> 21
<212> DNA
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<400> 33
tcatcgtggt tctctccttc c                                             21


<210> 34
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<220>
<223> /desc = "oligonucleotide"

<400> 34
ggaattcatg accacgaccg atc                                           23


<210> 35
<211> 28
<212> DNA
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<220>
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<400> 35
cgctccaggt gcaatgccgg gtgcaggc                                      28


<210> 36
<211> 22
<212> DNA
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<220>
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<400> 36
gatcacgctc ttcgagcggc ag                                            22


<210> 37
<211> 21
<212> DNA
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<220>
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<400> 37
gaactcggtg gagtcgatgt c   21

<210> 38
<211> 21
<212> DNA
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<220>
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<400> 38
gttgtcgatc aagacccgca c   21

<210> 39
<211> 22
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<220>
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<400> 39
catcgtcaag gagttcgacg gt   22

<210> 40
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tgcgcaggtc catgttcacc acgtt   25

<210> 41
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<400> 41
gctacgccct ggagagcctg   20

<210> 42
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<223> /desc = "oligonucleotide"

<400> 42
gtcgcggtcg gagagcacga c   21

<210> 43
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<212> DNA
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<223> /desc = "oligonucleotide"

<400> 43
gccagctcgg cgacgtccat c   21

<210> 44
<211> 19
<212> DNA
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<223> /desc = "oligonucleotide"

<400> 44
cgacgaggtc gtgcatcag   19

<210> 45
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<220>
<223> /desc = "oligonucleotide"

<400> 45
aattgatcaa ggtgaacacg gtcatgcgca ggatcctcga gcggaactcc atgggg   56

<210> 46
<211> 56
<212> DNA
<213>

<220>
<223> /desc = "oligonucleotide"

<400> 46
ccccatggag ttccgctcga ggatcctgcg catgaccgtg ttcaccttga tcaatt   56

<210> 47
<211> 32
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<223> /desc = "oligonucleotide"

<400> 47
aactcggtgg agtcgatgtc gtcgctgcgg aa                              32


<210> 48
<211> 27
<212> DNA
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<220>
<223> /desc = "oligonucleotide"

<400> 48
caatatagga aggatcaaga ggttgac                                   27


<210> 49
<211> 39
<212> DNA
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<220>
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<220>

<400> 49
tccggaggtg tgctgtcgga cggacttgtc ggtcggaaa                      39


<210> 50
<211> 33
<212> DNA
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<220>
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<400> 50
aggagcacta gtgcgggtac tgctgacgtc ctt                            33


<210> 51
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<212> DNA
<213>

<220>
<223> /desc = "oligonucleotide"

<400> 51
gggggatccc atatgcgggt actgctgacg tccttcg                        37


<210> 52
<211> 37
<212> DNA
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51

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<220>
<223> /desc = "oligonucleotide"

<400> 52
gaaaagatct gccggcgtgg cggcgcgtga gttcctc                          37


<210> 53
<211> 27
<212> DNA
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<220>
<223> /desc = "oligonucleotide"

<400> 53
agcggcttga tcgtgttgga ccagtac                                     27


<210> 54
<211> 27
<212> DNA
<213>

<220>
<223> /desc = "oligonucleotide"

<400> 54
ggcctatgtg gactacgtgt tgaacgt                                     27


<210> 55
<211> 31
<212> DNA
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<220>
<223> /desc = "oligonucleotide"

<400> 55
aacgcctcgt cctgcagcgg agacacgaac a                                31


<210> 56
<211> 27
<212> DNA
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<220>
<223> /desc = "oligonucleotide"

<400> 56
ttcgctcccc gatgaacaca actcgta                                     27


<210> 57
<211> 35
<212> DNA
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52

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<220>
<223> /desc = "oligonucleotide"

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gaaggagata tacatatgcg cgtcgtcttc tcctc                              35


<210> 58
<211> 32
<212> DNA
<213>

<220>
<223> /desc = "oligonucleotide"

<400> 58
cgggatcctc atcgtggttc tctccttcct gc                                32


<210> 59
<211> 32
<212> DNA
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<400> 59
cgggtaccat gcgcgtcgtc ttctcctcca tg                                32


<210> 60
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<212> DNA
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<220>
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<400> 60
cgggtacctc atcgtggttc tctccttcc                                    29


<210> 61
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<212> PRT
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<222> (1)..(13)
<223> /note= "SEQ ID No 11 from 38 to 50"

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  1               5                   10
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